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Promoting older adult wellness through an intergenerational physical activity exergaming program

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**Promoting older adult wellness through an intergenerational physical activity
exergaming program**

by

Kara Anne Strand

A thesis submitted to the graduate faculty

In partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Major: Nutritional Sciences

Program of Study Committee:
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ABSTRACT

Background. The older adult population has been on the rise since the 1900s and is projected to increase to 72.1 million people by 2030 (Administration on Aging, 2011). Today's older adults suffer from chronic diseases that are preventable with regular physical activity. Although physical activity has been shown to prevent or improve chronic diseases as well as improve physical fitness, balance, strength, flexibility, and overall quality of life, fewer than five percent of older adults are meeting the current recommendation for physical activity. Additionally, rural-residing older adults are half as likely to participate in physical activity as urban-residing older adults due to lack of facilities. Exergaming, or video gaming that incorporates physical activity into game play, is a relatively new means to obtain physical activity in an enjoyable and social way. Thus, the purpose of this study was to evaluate a community-based exergaming program (Living well through Intergenerational Fitness and Exercise [LIFE] Program) for rural-residing older adults designed to improve physical fitness, increase physical activity participation, and improve subjective health among the participants.

Methods. The basis of the LIFE Program was two theoretical behavior change models: Transtheoretical Model and the Whole Person Wellness Model. The Transtheoretical Model suggests behavior change occurs over time as a process of five stages (precontemplation, contemplation, preparation, action, and maintenance) rather than at one moment (Prochaska, Redding, & Evers, 1997). The Whole Person Wellness Model is a behavior change model, encompassing a holistic perspective on wellness that integrates six wellness dimensions (physical, emotional, spiritual, intellectual, occupational, and social) (Kang & Russ, 2009). The LIFE Program focused on reaching four of the six wellness dimensions: physical, emotional, intellectual, and social.

The LIFE Program was held at seven locations (five congregate meal sites, two senior apartments) in rural Iowa for older adults aged 60+ years. This crossover design study examined the impact that an intergenerational 8-week on-site exergaming program for community-residing older adults had on fitness levels. The on-site program met twice weekly and combined aerobic and resistance activity (60 minutes of Wii® EA Active total) with increased intensity and duration. As part of the intergenerational component of the program, the trainers and participants engaged in interactive games for a half hour once a week following the Wii®

exercises. Each site had two to three college-aged trainers lead the program. Trainers participated in a one-day training workshop to learn how to: use the Wii[®], assist older adults when leading the program, lead the interactive games, and apply safety precautions when working with older adults. Following the 8-week on-site program, participants were encouraged to continue the program on their own at the site. For an additional 16 weeks following the on-site program participants received eight biweekly wellness newsletters targeting physical activity, nutrition, and cognition.

A comprehensive questionnaire comprised of general demographic questions and valid, reliable assessments including the Late Life Function and Disability Instrument, Senior Fit Test (chair stand, back scratch, and handgrip [using dynamometer]), and the Cancer Prevention Research Center's Stages of Change for Physical Activity Questionnaire (2010). Questionnaires were completed at Weeks 1, 8, and 25 of the program. A qualitative evaluation questionnaire was completed at Weeks 8 and 25. Evaluations were analyzed for themes. Statistical Package for Social Sciences for Windows (SPSS for Windows, version 17.0, 2008) was used for questionnaire data analysis. An alpha of $p \leq 0.05$ was considered statistically significant. Demographic information was analyzed using descriptive statistics. All other collected data were analyzed quantitatively, using Analysis of covariance (ANCOVA), one-way and repeated measures Analysis of variance (ANOVA), and Cochran's Q.

Results. Forty-six older adults completed the program (67.6% completion rate). Reasons for attrition were for: 1) health ($n=9$), 2) too busy ($n=3$), 3) other exercise classes ($n=2$), 4) moving away ($n=1$), or 4) unknown reason ($n=6$). The majority of the participants were female (87%), Caucasian (100%), and widowed (52%). Significant improvement was seen in number of chair stands ($p < 0.001$), left arm back scratch flexibility ($p=0.004$), and right hand grip strength ($p=0.004$) from Week 1 to Week 8. Maintenance in leg strength, upper body flexibility, and hand grip strength was seen from Week 8 to Week 25. Self-reported health status had a significant influence on left hand grip strength and right arm flexibility; when controlling for health status in these measures, no significant improvements were shown. There were significant ($p \leq 0.014$) increases in self-reported regular physical activity participation (at least 30 minutes of physical activity at a time for at least four days weekly) by the end of the 25-week program among the participants who reported being physically inactive at the beginning of the

program. Qualitatively, participants' responses to the program were positive, with physical activity and social aspects being the best-liked features. Several participants reported many perceived positive changes made in their daily life with increased physical activity and wellness being the frequent responses.

Conclusions. These results suggest the LIFE Program was a well-received community-based physical activity program. Providing rural-residing older adults an opportunity to participate in group physical activity has the potential of 1) increasing fitness, 2) promoting socialization, and 3) improving subjective health. Additionally, these findings indicate that an intergenerational exergaming program may be an effective strategy in improving flexibility and strength and increasing physical activity in rural-residing older adults. The participants' perceptions of improved wellness and their positive reaction to the physical activity increase the likelihood of program continuation.

CHAPTER I: INTRODUCTION

Background

The American population is aging with 13% of the total population age 65 years old and older (United States Census Bureau, 2011a). As adults age, their ability to remain physically and socially active may decline, resulting in loss of function and ability to perform daily tasks. This loss of function and ability negatively impacts both their physical and social well-being (Cohen-Mansfield & Frank, 2008). Physical activity is a key modifiable behavior shown to have several benefits to the aging population.

Physical activity can prevent or lessen the effects of chronic diseases, improve strength, flexibility, and balance, and increase life satisfaction and quality of living among older adults (Dionigi, 2007). However, even with these motivating benefits, fewer than five percent of older adults are currently meeting the Center for Disease Control (CDC) physical activity recommendations of at least 150 minutes of weekly moderate-intensity physical activity (Rosenberg, et al., 2010). Rural-residing older adults are half as likely to participate in physical activity as urban-residing older adults (Shores, et al., 2009). Perceived barriers to physical activity by older adults include 1) programs are not geared towards their needs and capabilities, 2) affordability, 3) living location and 3) lack of knowledge or experience to be physically active on their own (Martinson, et al., 2008; Hildebrand & Neufeld, 2009; Shores, et al., 2009; Dorgo, et al., 2009).

Exergaming, which includes video games that promote health, fitness, and physical activity, is a new way older adults can participate in physical activity (Papstergiou, 2009). Due to the nature of exergaming, it has the added benefits of increasing motivation and adherence to physical activity while also providing a means for socialization and entertainment (Warburton, et al., 2007).

Providing a community-based exergaming program for older adults may help increase physical activity participation as it provides social interaction, structured guidance, and a source of motivation in an enjoyable way. Furthermore, exergaming programs have the potential to help older adults meet their physical activity needs, thereby helping to maintain quality of life, prolong independence, and prevent chronic diseases for the aging population.

Goals and Objectives

The overall objective of this project was to pilot test a community-based, intergenerational exergaming program for older adults. The central hypothesis was that the LIFE Program would increase physical functioning, fitness, physical activity participation, and subjective health. This hypothesis is based on existing evidence regarding traditional physical activity and intergenerational programming that leads to improvement of health outcomes in older adults.

The long-term goal is to provide evidence-based health promotion programming to older Iowans by determining the effects of the LIFE Program on older adult health and subjective well-being through exergaming and theory-based wellness newsletters. This long-term goal will be achieved by pursuing these research questions:

- 1) To what extent is the LIFE Program capable of improving physical functioning and reducing the number of reported physical limitations (e.g. ability to climb stairs)?
- 2) To what extent is the LIFE Program capable of improving functional fitness?
- 3) To what extent is the LIFE Program capable of improving self-reported participation in physical activity?
- 4) How is the program perceived by participants?

This program was sponsored by The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

Thesis Organization

This research-based thesis will begin with a review of literature relative to older adult health, the congregate meal program, physical activity, intergenerational programs, exergaming, and theory-based health programs and models. Next, the methods for the LIFE Program are described in detail followed by two complete manuscripts. Manuscript authors were either part of the LIFE Program research team or an undergraduate student who assisted in assessing the qualitative data from the participants' evaluations. Dr. Sarah Francis is the author for correspondence. Conclusions, appendices, references, and acknowledgements will conclude the thesis.

CHAPTER II: REVIEW OF LITERATURE

With advancing medical technology and the aging baby boomer generation (adults born between 1946 and 1964), the older adult population is growing rapidly. However, the amount of physical activity these adults participate in has not followed a similar trend. Physical activity provides several benefits for older adults, including prevention or reduction of chronic diseases, increased flexibility, and improved balance (Dionigi, 2007). Most older adults are inactive due to several reasons, such as low self-efficacy, limited program availability in rural locations, lack of knowledge on how to exercise, and financial constraints (Dionigi, 2007; Dorgo, Robinson, & Bader, 2009; Hildebrand & Neufeld, 2009; Hughes, et al., 2005). Those who participate in older adult physical activity programs have not only valued the activity for physical reasons, but have also reported fulfillment from social interactions with other participants as well as the support and encouragement received from the group (Dionigi, 2007; Layne, et al., 2008).

Exergaming, video gaming with exercise, is becoming a popular way to increase physical activity among all age groups. Individuals can have fun while video gaming and also gain benefits from the physical activity. Exergaming helps lower attrition rates, while increasing program adherence (Papstergiou, 2009). Older adults who exergame have had positive comments on how they feel emotionally and physically after playing. Low cost, exergaming physical activity programs targeting older adults can help increase the overall well-being and independency of the growing older adult population.

Background

Older adults are persons over the age of 65, with sub-populations due to the dramatic increased numbers along with the extended life expectancy (Cohen-Mansfield & Frank, 2008). The “young-old” consists of those older adults between the ages of 65 and 74, “older old” includes those age 75-84, while the “oldest-old” is identified as those age 85+ (Dodge, et al., 2008). As adults age, their ability to remain physically, cognitively, psychologically, and socially active may decline, resulting in loss of function and ability to perform daily tasks. This negatively impacts both their physical and social well-being (Cohen-Mansfield & Frank, 2008). The quality of life (QOL) of an individual is the ability he or she has to do and enjoy normal daily activities. One’s QOL can be affected by several factors, including biological aging,

number and severity of chronic diseases, malnutrition, and lack of physical activity, and must be taken into consideration in program development targeted towards the older adult population (Romack, 2004).

The American population is aging; currently 40.4 million Americans (13% of the total population) are age 65+ (United States Census Bureau, 2011a). This is an increase of 15.3% or 5.4 million people since 2000 (Administration on Aging, 2011). From the recent 2010 Census, Iowa ranked fifth among the 50 states for the percentage of adults age 65+ (United States Census Bureau, 2010). Currently, there are 444,554 Iowans age 65+ (14.8% of the Iowa population) (United States Census Bureau, 2010). Specifically, 10% (8,935) of Story County residents are age 65+ (United States Census Bureau, 2010). By 2020, the United States' older adult population age 65+ is expected increase to 55 million and by 2030, nearly doubles (72.1 million), representing almost 20% of the American population (Administration on Aging, 2011). This dramatic increase is due to the “baby boomer” generation reaching the 65+ years range (Administration on Aging, 2011). The National Institute on Aging (2011) estimates that by the year 2040, there will be a doubling of adults aging from 65 to 84 and a quadrupling of those age 85+ by 2050.

Socioeconomic barriers. The increase in the older adult population is even more disturbing when almost one in five older adults has a household income at or below 130% of the federal poverty level (Higgins & Barkely, 2004). Data show that almost 10%, or 3.6 million, older adults live below poverty and 26% are considered low-income (Kamp, Wellman, & Russell, 2010). Another 2.2 million older adults are near poor, which means they are at 125% of poverty (Association of American Retired Persons (AARP) Public Policy Institute, 2008). Poverty can negatively affect positive responses to nutrition education programs and is also often linked with nutritional problems in older adults. Based on the Healthy Eating Index, 83% of older adults do not consume a good quality diet and those in poverty have lower scores than those not in poverty (Kamp, et al., 2010). Those experiencing food insecurity, a term used to describe those not having sufficient access to safe and nutritious food, have lower intakes of micronutrients and energy, more health problems, and functional limitations related to loss of independence (Kamp, et al., 2010). For instance, the presence of risk factors for obesity, diabetes, and hypertension are significantly higher among those older adults living in poverty

than those who are not (AARP Public Policy Institute, 2008). This increase in risk factors may be due to the fact that those in poverty have less access to health care. Almost 25% of those living in poverty age 50+ reported not being able to see a doctor within the last 12 months because of the cost (AARP Public Policy Institute, 2008).

In addition to poor nutrition, those in poverty have been shown to participate less frequently in leisure physical activity. Adults below the poverty level participated in at least some activity only 42.5% of the time, while those adults four times or more above the poverty level participated in at least some activity 72.2% of the time. Adults with a family income four or more times above the poverty level were twice as likely to participate in regular physical activity than those adults who had incomes below the poverty level, with only 20% of those below poverty level participating in regular activity (Schoenborn & Adams, 2010).

Disabilities. Disabilities, including sensory, physical, and mental, can be issues in older adults, which is another risk factor. Limitations are important because of its relationship with the ability to live independently and the overall QOL in older adults. These disabilities can result in impaired ability to perform activities of daily living (ADL), such as bathing, dressing, eating, or getting around the house (Administration on Aging, 2011). In a recent report, 27% of community-residing adults age 65+ reported having difficulty performing one or more ADL. For some (approximately 12.5%), it can also affect one's ability to do instrumental activities of daily living (IADL), such as preparing meals, shopping, managing money, or taking medication (Administration on Aging, 2011).

The prevalence of physical limitations and disabilities increases with age with only 17% of those aged 18 to 64 years reporting disabilities (Hughes, et al., 2005). Thirty-seven percent of older adults have at least one disability with 56% of the oldest old (85+ years) having a severe disability as well as a higher likelihood of at least one physical limitation than the youngest old (Administration on Aging, 2011; Holmes, Powell-Griner, Lethbridge-Cejku, & Heyman, 2009; Hughes, et al., 2005).

Functionality and fitness have direct effects on food security, diet quality, weight status, well-being, and independence. Inability to do physical tasks necessary for shopping and food preparation increases the likelihood of inadequate food intake. Functional limitations affect 42% of people age 65+ (Kamp, et al., 2010). Additionally, disabilities also have a strong relationship

with reported health status. About two-thirds (64%) of adults age 65+ with a severe disability reported that their health was fair or poor. Contrary to this, of those adults who did not have a severe disability, only 10% reported their health as fair or poor (Administration on Aging, 2011).

Chronic diseases. Another risk factor experienced by several older adults that hinders their QOL is chronic disease. Older adults are more likely to suffer from at least one chronic disease than any other age group. Older adults with chronic diseases consume health care dollars at a rate four times that of younger adults (Freid & Bernstein, 2010). Most older adults have at least one chronic condition, with many having multiple conditions. The majority (80-86%) of adults age 70+ have a nutrition-related chronic disease, such as diabetes, hypertension, or dyslipidemia (Higgins & Barkely, 2004). Hypertension, the leading chronic disease afflicts 48% of older adults. Following closely behind hypertension is arthritis (47% afflicted) and heart disease (32% afflicted).

Malnutrition pertains to both overweight and underweight individuals and both circumstances have equal chronic health problems associated with them. One quarter of older adults age 60+ are obese (Administration on Aging, 2011). Despite higher obesity rates in the young-old, malnutrition and underweight are of concern for the older-old (age 75+). Over one million community-dwelling older adults and between 35-50% of older adults living in long-term care facilities are malnourished (National Resource Center on Nutrition, Physical Activity & Aging). Being underweight can lead to sarcopenia (loss of muscle mass and strength) and impaired muscle function, decreased bone mass, immune dysfunction, reduced cognitive function, and delayed recovery from illness or surgery (Cohen-Mansfield & Frank, 2008).

Cognitive impairment. Psychosocial issues and mental and cognitive impairment contribute to malnutrition, food insecurity, and dependence. Depression due to social isolation, financial difficulties, loss of autonomy, mobility limitations, or impaired cognition is common and often leads to loneliness (Kamp, et al., 2010). Loneliness has been associated with a loss of motivation to eat or to eat healthful meals and decreased psychological effects, including depression (Kamp, et al., 2010). In 2004, about 20% of the older adults in the United States suffered from symptoms of depression, including sadness, hopelessness, or worthlessness (Cohen-Mansfield & Frank, 2008).

Congregate Meal Program

Due to the aforementioned risk factors for low QOL often experienced by older adults, this population is at increased nutritional risk. Thus, it is imperative they receive nutritious meals. Older adults who are without adequate food intakes are equal to being 14 years older than their biological age (Administration on Aging, 2008). The purpose of the Older Americans Act (OAA) Nutrition Program is to “promote the health and well-being of older individuals by assisting such individuals to gain access to nutrition and other disease prevention and health promotion services to delay the onset of adverse health conditions resulting from poor nutritional health or sedentary behavior” (Kamp, et al., 2010). This goal is achieved by providing meals to older adults that meet at least one-third of the Dietary Reference Intakes for older adults and that meet the most recent Dietary Guidelines for Americans (Kamp, et al., 2010). The Administration on Aging released findings in 1996 that meals supported by OAA, such as congregate meals, are the primary source of daily nutrients for participants (O'Shaughnessy, 2004). For over half (54%) of participants, the congregate meal provides the only fruit they eat during the day and about one quarter (24%) said the meal provides the only vegetable they receive during their day. Further assessment has identified 80% of participants maintaining or improving their nutrition risk score through the meal program (Administration on Aging, 2008).

It is a mutual goal of national organizations and the government alike that all older adults have access to food and nutrition programs that ensure the availability of safe, adequate food to promote optimal nutritional status (O'Shaughnessy, 2004). Because of this, the U.S. Department of Health and Human Services—Administration on Aging established congregate meals, a federal food and nutrition assistance program, as a dimension of its OAA Nutrition Program. This service is intended to provide nutritious meals in a social setting for adults age 60+. The OAA Nutrition Program provides grants to state agencies on aging to support congregate meals and home-delivered meals in order to address the problems of dietary inadequacy and social isolation among older adults (O'Shaughnessy, 2004).

The OAA Nutrition Program is the largest community-based nutrition program for older adults in the country (Kamp, et al., 2010). Currently, 236 million congregate and home-delivered meals are served to 2.6 million older adults every year, with congregate meals being served in a variety of sites. Sites include such places as senior centers, community centers, schools, and adult daycare centers. The congregate meal program is targeted towards lower-

income, minority, and rural older adults; however, these are not criteria that must be met in order to participate in the meals (Kamp, et al., 2010).

Several communities, especially in rural areas, are not designed to effectively provide for the needs of older adults in order to help them remain active and socially connected. However, community congregate meal sites help this age group maintain healthier and independent lives. In addition to providing meals, congregate meal sites may also offer a variety of social services such as nutrition education and screening, shopping assistance, and health promotion activities. These services and meals help keep older adults healthy and prevent the need for more costly medical interventions (Administration on Aging, 2002).

Socialization. Congregate meal sites provide a way for older adults to have positive interactions with other older adults in their community. Congregate meal participants have more social contacts than those who do not. Being part of a community of older adults provides social contact and support for health behavior change (Layne, et al., 2008). Additionally, eating with a spouse, friend, or caregiver has been shown to improve energy intake and lower nutrition risk in older adults (Kamp, et al., 2010).

Congregate meal site activities. Congregate meals provide older adults the opportunity to volunteer in the program as well as engage in a variety of recreational activities offered at the meal sites. The original legislation of the OAA Nutrition Program envisioned the program to be “more than a meal” with an objective to provide an opportunity for meaningful community involvement (Administration on Aging, 2002). Participants report volunteering gave them the positive satisfaction of believing they were “a part of the place”. Also, the participants recognized their need for cognitive stimulation, which is provided through not only the social interaction but the activities offered at the sites. Participants appreciate the opportunity to be “kept young and mentally active” with 70% of congregate meal participants nationwide engaging in recreational activities offered. These activities promote overall health and functionality for older adults (National Resource Center on Nutrition, Physical Activity & Aging, 2001).

Physical Activity and Older Adults

A combination of good nutrition and physical activity is needed and important in maintaining health in all individuals. This balance between the two becomes especially true for older adults when overall health and well-being is declining. Physical activity is a key modifiable behavior for improving physical health conditions and functioning and reducing depressive symptoms in older adults (Rosenberg, et al., 2010). It is an effective preventative strategy against numerous chronic diseases affecting older adults (e.g. cardiovascular disease, obesity, stroke, hypertension, Type 2 diabetes, and psychological disorders) (Warburton, et al., 2007).

However, even with these significant contributions, fewer than five percent of older adults meet the CDC physical activity recommendations (Rosenberg, et al., 2010). According to the CDC and the 2010 Dietary Guidelines for Americans, an inactive individual is defined as one not engaging in at least 150 minutes of moderate-intensity physical activity every week or 75 minutes of vigorous-intensity physical activity every week (CDC, 2011). Unless older adults age 65+ are unable to meet these guidelines, in which case they should be as physically active as they are capable, older adults age 65+ are to follow the same guidelines as for adults less than 65 years (CDC, 2011). Slightly different recommendations are provided by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA), which state adults should take part in a minimum of 30 minutes of moderate-intensity aerobic physical activity on five days each week or at least 20 minutes of vigorous-intensity aerobic activity on three days each week (ACSM, 2007). In addition to ACSM's recommendations for adults age 18-64, it also recommends older adults age 65+ partake in flexibility activities to maintain the flexibility needed for regular physical activity as well as daily life (ACSM, 2007). Both the ACSM and CDC recommend older adults age 65+ participate in balance and flexibility activity to prevent falls (ACSM, 2007; CDC, 2011).

The amount of physical activity participated in decreases with age. Participation in general physical activity begins to decrease after age 64 (Schoenborn & Adams, 2010). Those adults participating in *some* physical activity (defined as any light-moderate or vigorous physical activity lasting at least 10 minutes) decreased from 66.3% for adults 18-24 years old to 39.6% of adults over 75 years in the United States between 2005 and 2007. Those participating in *regular* physical activity (defined as at least 30 minutes of light to moderate activity five or more days

per week) also decreased with age with 37.5% of adults 18-24 years old participating to only 17.4% of adults over the age of 75 participating (Schoenborn & Adams, 2010).

Currently, over 87% of adults age 65+ years and 94% of adults aged 75 or older are inactive (CDC, 2007). It is estimated that 33% of men and 50% of women age 75+ engage in no physical activity (Hughes, et al., 2005). These inactive adults account for substantially higher medical costs as compared to their active counterparts (Pratt, Marcera, Wang, 2000).

Older adults considered to be physically active by the CDC criteria were more likely to have a partner for physical activity, felt activity facilities were safe, indicated they could walk to parks, and perceived they had recreation areas close to their homes than those who were not physically active (Shores, et al., 2009).

Barriers to physical activity. Health benefits cannot be achieved and sustained unless physical activity is maintained over a period of time. Unfortunately, lack of adherence to exercise programs is a key barrier to physical activity among older adults. There is typically a 50% attrition rate within three to six months of starting an exercise regimen (Rosenberg, et al., 2010). This reason may partly be related to the fact that most older adults attend programs not geared towards their needs and capabilities. After surveying several facilities within seven different states for older adult physical activity programs, Martinson et al. (2008) found that most (55%) were not focused to older adults (Hughes, et al., 2005). More physical activity programs are needed for older adults that incorporate moderate intensity physical activity and are simple, convenient to participate in, inexpensive, and noncompetitive (Martinson, et al., 2008).

Availability of affordable physical activity programs is another participation barrier among older adults. Many older adults are on a fixed income and have identified cost of programs as a barrier (Hildebrand & Neufeld, 2009). Three main reasons for the lack of affordable physical activity programs for older adults in established facilities (e.g. commercial gym, senior center, park or recreation center, church, hospital, or school) is due to a perceived lack of interest from older adults (50% of facilities), lack of funding (46% of facilities), and lack of staff interest (44% of facilities) (Hughes, et al., 2005).

A common barrier, lack of knowledge or experience to be comfortable exercising alone, leads to decreased physical activity participation (Dorgo, et al., 2009). Social support has a significant role in the physical activity participation with companionship during activities being

shown to improve older adult participation (Shores, West, Theriault, & Davison, 2009). Also, many do not have the self-efficacy needed and are not confident in their ability to do physical activities. If older adults believe they are participating in moderate physical activity or activities that could be risky, they will be less likely to enroll or participate in the programs. To prevent this avoidance, it is important for programs to clarify what “moderate” means and give examples of activities relevant to older adults (Hildebrand & Neufeld, 2009).

Additionally, the location of one’s home can serve as a barrier to physical activity. Rural older adults are less than half as active as urban older adults due to barriers associated with their rural environment (Shores, et al., 2009). Perceived access to facilities providing opportunities for physical activity and neighborhood walkability directly correlates with physical activity levels (Shores, et al., 2009). A study by Shores and others (2009) showed increased physical activity with well-maintained sidewalks, accessible destinations, and an aesthetically pleasing environment to walk or bike. Several of these components to increase physical activity are not present in rural areas. For instance, a particular study found that only 19% of the rural older adults in the sample lived within walking distance of a park (Shores, et al., 2009).

Transportation and safety have also been found to negatively impact one’s ability to maintain an active lifestyle (Shores, et al., 2009). Transportation may be difficult for older adults who can no longer drive or depend on others to be taken to locations. Safety may include fear of injury during participation or the neighborhood setting and perceived personal safety (Shores, et al., 2009).

Additionally, the socioeconomic status of rural individuals, which may be lower than those in an urban environment, may prevent this population from being able to afford gym memberships or participating in fee-based activities. Suburban, higher income residents are twice as likely to be physically active than rural, lower income residents (Parks, Housemann, Brownson, 2003).

Perceived physical activity benefits. Physical activity is not only successful in preventing chronic diseases, but can lessen effects of chronic diseases, such as arthritis, heart disease, and diabetes. Regular physical activity reduces the risk of dying prematurely and of developing diabetes, high blood pressure, and colon cancer (Hughes, et al., 2005). It also helps control weight and maintains bone mineral density (Hughes, et al., 2005).

Participating in regular physical activity improves physical fitness, strength, flexibility, and balance as well. These are all necessary components in maintaining independence, improving health-related QOL, and increased performance in ADLs. Dionigi (2007) found that after 12 weeks of physical activity, the older adult participants had improved strength, balance, coordination, and fitness, which they thought had a positive effect on their ability to carry out “normal things” associated with daily living. These benefits also decrease the likelihood of falling and prevent the development of age-related diseases (Dionigi, 2007). Similarly, Romock (2004) found that nursing home residents who participated in strength training for eight weeks reported having participated in more overall ADLs than those who did not.

Besides increased physical fitness, physical activity is positively associated with psychological well-being in older adults including improved mood and perceived QOL as well as increased life satisfaction, self-concept, self confidence, and cognitive functioning (Dionigi, 2007). Older adults have identified having a more positive self-esteem with decreased levels of stress, anxiety, and depression after participating in physical activity. Participants in a resistance training study lead by Dionigi said the physical activity made them “feel good” mentally. They had a sense of satisfaction in “taking control” of their health (Dionigi, 2007).

Improved self-efficacy in one’s perceived ability to be physically active was found in older adults participating in physical activity programs. Increased self-efficacy transcends to multiple areas of a person’s life outside of the person’s confidence in being able to perform the physical activity. Once self-efficacy is established, it can be generalized to other situations that are common to the activities where self-efficacy was increased. For example, the increased self-efficacy an older adult may gain in relation to exercise and functional ability is generalized to other types of exercise, such as walking and other daily activities that require functional ability, such as getting out of bathtub and gardening. Self-efficacy is one of the most effective strategies in motivating older adults to be physically active (Dionigi, 2007).

Physical activity benefits. Physical activity programs offer several benefits to older adults such as increasing the number of older adults meeting physical activity recommendations. Physical activity behavior of older adults can be effectively changed through intervention programs like group- and community-based interventions (Martinson, et al., 2008; van Stralen, de Vries, Mudde, Bolman, & Lechner, 2009). These group- and community-based interventions

help reduce the barriers perceived by older adults and increase the opportunities available for them to be physically active (Layne, et al., 2008).

Physical activity programs have the ability to increase the number of physically active older adults because they provide social interaction, structured guidance, and a source of motivation. Social support can be given by family, friends, others participating in the physical activity, or the program leader. Social interactions, including social support and influence, play a key role in the development of feelings of good health and wellbeing by older adults. Older adults in physical activity programs state they enjoy the opportunities for positive social interaction with the others around them (Dionigi, 2007). The social support given in group programs can counteract the isolation older adults often experience (Layne, et al., 2008). An opportunity for social engagement is a positive reason why older adults join a physical activity program. One participant in a physical activity program commented on the reason for his enrollment: “I thought it would be a chance to make friends” (Hildebrand & Neufeld, 2009).

Allowing older adults to exercise at the same time also increases modeling, emotional and informational support, and enjoyment. Dionigi (2007) found significance in the relatedness between exercise behavior and social support through friends; it was concluded that social interactions is one of the most effective ways in motivating older adults to continue being physically active. Additionally, “motivation for engaging in physical activity” was a reason indicated as to why participants in another program enrolled. One participant mentioned, “A group does help. It gives you more incentive to go and do it” (Hildebrand & Neufeld, 2009).

Because a common barrier to participating in physical activity is the lack of knowledge or experience, physical activity programs must provide the guidance and supervision needed to help older adults properly exercise and gain knowledge in a non-intimidating and friendly environment (Dorgo, et al., 2009). Structured programs are helpful for physically inactive older adults who need instruction and support in getting started and integrating behavior change into their lifestyle (Hughes, et al., 2005).

Programs: peer leading. Physical activity programs are often led by professionals because of their knowledge and expertise in the area of exercise. This can help with motivation and guidance of the activity; however, peers have also been shown to be effective in leading programs. Since peers can relate on a more equal level, peer mentors can be empathetic towards

a peer's situation. Peer mentors are nonprofessionals who receive preparation and act as a unique resource for those with similar characteristics to themselves (Dorgo, et al., 2009). With positive role-modeling, older adult peer mentors are better able to diminish stereotypes or false beliefs about aging and their inability to be physically active than a professional could (e.g. frailty, negativity, and senility) (Dorgo, et al., 2009). Older adults like receiving physical activity ideas from peers (Hildebrand & Neufeld, 2009). A participant stated, "It shows you that seniors can do it if they try—comparing notes with other seniors." Older adults are also more confident that they will receive appropriate physical activity suggestions from their peer mentors (Hildebrand & Neufeld, 2009). Because of these benefits, peer mentoring can promote better adherence to regular physical activity by older adults.

Dorgo et al. (2009), found that after a 14-week physical fitness intervention for older adults, those trained by peer mentors had significantly improved perceived physical, mental, and social functioning while those with student mentors did not. The peer mentor group had perceived overall improvement in physical and mental well-being, better social functioning, enhanced ability to carry out physical and emotional roles, improved general health, and an increased level of vitality. It was concluded, therefore, that even though the older adult peer mentors were new to physical activity and the mentor role, peer mentors are still successful and effective in physical fitness interventions for older adult participants (Dorgo, et al., 2009).

Peer leading also has the advantage of providing a means for program sustainability. Peer mentors provide a way to increase the number of easily accessible, evidenced-based exercise programs for older adults since professional instructors are not required. Layne et al. (2008) found that peer mentors are able to disseminate a strength training program just as effectively and successfully as the fitness professionals. Utilizing older adults already established in a community and training them to become peer mentors acts as a feasible way of disseminating community-based fitness programs for older adults (Layne, et al., 2008).

Intergenerational Programs: Definition

While peer mentoring allows for an interaction among one's peers, intergenerational mentoring also has its benefits and is an opportunity to integrate the generations together in a program. The number of intergenerational programs has increased in recent years and present an opportunity for impactful and meaningful interaction between generations that is limited in

today's society. Today, there is reduced interaction between generations emotionally, physically, and socially (Kaplan, Liu, & Radhakrishna, 2003). Intergenerational programs help lessen this gap. According to the International Consortium for Intergenerational Programs, intergenerational programs are "social vehicles that create purposeful and ongoing exchange of resources and learning among older and younger generations" (Kaplan, et al., 2003).

Intergenerational programs bring together people from different generations to help enhance understanding and appreciation between the participants. Intergenerational programs allow people of all ages to share their talents and to support each other in relationships that benefit both the young and the old. Through the interaction in intergenerational programs, each generation gives and receives, mixing the wisdom of the older generation with the energy of the younger generation (Butts & Chana, 2007).

Intergenerational programs can vary in location (e.g. schools, community organizations, retirement communities, hospitals, and places of worship) and in how the generations interact (Kaplan, et al., 2003). Programs include those where the youth serve the older adults. In these instances, youth may be involved in teaching the older adults to use computers, mentoring older immigrants in preparation for citizenship tests, or assisting homebound older adults by delivering meals or finishing home projects. Programs can also take the form of older adults mentoring the youth where older adults may tutor a child or lead a nature walk. Finally, youth and older adults can serve together in intergenerational programs. In these instances, generations work side by side in meeting the needs of a community (Butts & Chana, 2007). All of these types of intergenerational programs are successful in breaking down the barriers that have been formed in today's society between the generations.

Intergenerational Programs: Effects

Older adults. Intergenerational activities can improve the overall wellbeing and QOL in older adults. Intergenerational programs promote "active aging", where older adults are engaged in life and the world around them. Older adults who volunteer with children burn 20% more calories per week and experience fewer falls (Butts & Chana, 2007). The older adults remain productive and valued as contributing members of society. Programs where older adults know they are depended on and have a purpose give the older adults a reason to get up each day and to

look forward to the day ahead. It also provides older adults the opportunity to show the value of volunteerism and community involvement to the younger generation (Butts & Chana, 2007).

The younger adults in intergenerational programs do more than just provide encouragement, instruction, feedback, and leadership to the older adults; most importantly, they provide friendships and enjoyment to the older adults in the program. After a resistance training program led by student coaches for older adults, one participant commented, “The other thing too that I enjoyed was the contact with the young people...Good to know what they do and what they think. That was good contact. Intergenerational meeting...I thought that was one of the plusses” (Dionigi, 2007).

Younger adults. In today’s society, little interaction between generations has created gaps between the two, creating misconceptions about older adults. Children who do not have the opportunities to interact with their grandparents are likely to have negative feelings about older adults (Chen, 1997). Additionally, younger adults who have little knowledge about older adults have more anxiety about the aging process along with more negative attitudes towards older adults (Allan & Johnson, 2009). Younger adults have formed several misconceptions about the older generation, such as thinking of them as “set in their ways” and assumptions of older adults being frail, unable to do anything, and in poor health. For most older adults, this is false. Intergenerational programs allow for younger adults to witness this for themselves. Younger adults who participate in intergenerational programs have been shown to have positive changes in perceptions of aging and older adults. For example, after completion of an intergenerational program conducted in a nursing home, journal entries by the younger adults showed an overall better understanding and more positive attitudes about aging. One specific comment made by a younger adult was, “I do know that I have been deeply affected by working in this facility. They are not just grumpy, old people waiting to die.” Another comment was, “A societal belief is that [older adults] are not active people but rather sedentary, boring, and uninterested in participating in exercise programs. It became obvious to me during this service-learning project that [older adults] like to be active, move, and have fun” (Romack, 2004).

An intergenerational program that is most beneficial for the younger adults’ perceptions on aging and older adults is one that focuses on the *quality* of interactions between the generations rather than the *quantity* of time spent. The characteristics of contact with the older

adults, such as whether the interactions are voluntary, involve cooperation, or have the potential for building friendships, can have an impact on the success of the program. Therefore, providing the younger adults the opportunity to interact and form a personal relationship with the older adults during intergenerational programs can improve the younger adults' views and knowledge on aging as well as minimize their anxiety about the aging process (Allan & Johnson, 2009).

Additionally, younger adults also benefit from intergenerational programs by having the opportunity to be recognized and valued as useful and contributing members in the community. These opportunities allow the younger adults to share their unique talents and skills with older adults while developing skills in leading groups simultaneously (Butts & Chana, 2007).

Exergaming: Definition

While there are many different ways for individuals to be active, there is a new means of physical activity that is just now being realized as a valid way to meet the physical activity recommendations. This physical activity is exergaming and has the potential to help older adults meet their physical activity needs, thereby helping them maintain their QOL and independence.

Exergaming incorporates exercise with video games. Rather than the traditional video games, which have been considered to result in inactivity and obesity, exergaming includes video games that promote health, fitness, and exercise (Papstergiou, 2009). It is a way to involve physical activity as a means of interacting with the game. Exergaming incorporates several different innovative exertion interfaces such as electronic dance pads, motion platforms, bicycle ergometers, and motion-tracking cameras. These devices allow the player to control the game through his or her motor actions (Papstergiou, 2009). This relatively new way of exercising and gaming has provided a fun and interactive way for youth and adults to stay physically active in a more enjoyable way.

It has only been in the last 10 years that exergaming has been realized as a tool for physical activity, rather than solely being utilized as a leisure activity. Early exergame studies found that reinforcing physical activity with sedentary behavior, such as playing traditional video games or watching television, is a simple and effective means of increasing physical activity participation and improving one's health status (Saelens & Epstein, 1998). Since this time, further research, although mostly done with youth and younger adults, has been done on video

games that incorporate physical activity within the actual game, which are now termed “exergames”.

Exergaming: Benefits

Increased motivation and adherence. The focus of exergames is the actual game being played, making the physical activity exerted during the game second priority. This, therefore, increases one’s motivation to participate in physical activity. It feels less like a workout than it does simply playing a fun video game (Chin A Paw, Jacobs, Vaessen, Titze, & W, 2008). Sell, Lillie, and Taylor (2008) found that physical activity through exergaming (Dance Dance Revolution) was preferred over treadmill walking; this type of physical activity still achieved or came close to the ACSM physical activity recommendations in terms of energy expenditure (minimum of 150 kilocalories expended from physical activity per day) (ACSM, 2007). Graves et al. (2010) discovered that there was more enjoyment from participants playing the Wii® Fit balance and aerobic activities than using the treadmill or than simply playing a handheld video game that included no physical activity. This suggests that individuals may be more likely to adhere to the sustained light to moderate intensity exergaming than that of walking on a treadmill, which can often lead to boredom and annihilation of activity (Graves, et al., 2010).

Performing an activity within a group can also help motivate individuals to stay active. Exergames where multiple players can participate maximizes motivation to play, leading to increased physical exercise. Therefore, for those that have difficulty continuing in physical activity, some form of guided and socially interactive exergame may help sustain motivation. These findings support the assertion that exergames may constitute an ideal way for promoting physical activity to those who may be reluctant to participate in traditional types of exercise (Chin A Paw, et al., 2008).

Warburton, et al. (2007) found that college aged males playing interactive video games during stationary cycling had significantly greater participation rates than those who exercised on standard stationary bicycles. Males in the interactive video game intervention attended approximately 30% more frequently than those in the traditional training group (Warburton, et al., 2007). Those in the traditional training group appeared to have a progressive decline in participation over time (Warburton, et al., 2007). It is reasonable to predict, then, that a program that combines physical activity with a preferred leisure activity, such as playing a game, is more

likely than traditional exercise programs to lead to greater adherence and associated health benefits (Warburton, et al., 2007).

Physical fitness. Exergaming offers an alternative mode of physical activity for people of all ages. Although the types of exergames available vary in intensity, exergames can provide a level of physical activity intensity that meets the ACSM physical activity recommendations of a minimum exercise intensity of 60% of heart rate max (HR_{max}) or 50% of heart rate reserve (HRR) (Tan, Aziz, Chua, & Teh, 2002). Other significant improvements in health status found from exergaming include: increase in maximal oxygen consumption (VO_{2max}), reduction in maximal heart rate, increase in oxygen pulse, and reduction in resting systolic blood pressure (SBP) (Warburton, et al., 2007). When actively played over time, exergames lead to improvement or maintenance of cardiorespiratory fitness and weight loss (Tan, et al., 2002). Benefits gained from exergames are relative to the fitness of the participant. Unnithan, Houser, and Fernhall (2006) found that overweight children had a significantly higher absolute VO_{2max} during exergame play compared to non-overweight children.

However, for exergames such as the Wii[®] Fit, energy exertion and the increase in heart rate is not as high as that of briskly walking or jogging on a treadmill (Graves, et al., 2010). Wii[®] Fit activities provide physical activities ranging in the light (<3 Metabolic Equivalent of Tasks [METs]) to moderate intensities (3-6 METs), excluding vigorous intensities (>6 METs) all together. METs are used to express the energy cost of physical activities and are an index of the intensity of activities. A MET is the ratio of the energy expended during an activity to the resting energy expenditure of an individual. Therefore, one MET is a person at rest. Moderate intensity activity consisting of three to six METs can contribute to the adolescent and adult recommendations for health-benefiting physical activity. Activity of light intensity (<3 METs) meets the older adult activity recommendations and can help reduce their risk of all cause-mortality, cardiovascular disease, and Type 2 diabetes (Graves, et al., 2010). Graves (2010) found that all of the exergaming activities in his study were potentially beneficial to all age groups since the games encouraged a reduction of sedentary behavior.

The total volume of exercise positively relates to the health benefits gained. Therefore, exergaming, which appears to lead to improved motivation and adherence to physical activity, may be able to improve and maintain good health in individuals. By promoting physical activity,

exergames can improve fitness levels, help achieve weight loss, and can enhance one's motor skills (Papstergiou, 2009).

Individualized. Exergaming is advantageous over other physical activity videos in that it can accommodate for both low- and high-ability players by having several different difficulty levels available. This also prevents increased frustration or exasperation with the game. It invites perseverance and meets the player at his or her level first, while still being able to advance with the player as his or her abilities and skills increase (Papstergiou, 2009). Additionally, exergames allow for choice among activities, such as different sports that can be played on Nintendo's Wii®. This allows for individualizing the exercise one participates in to that which is most interesting to the individual (Rosenberg, et al., 2010).

Exergaming: Benefits for Older Adults

Socialization. Exergames can offer opportunities for social interaction and health-related social support both within the game and around it, which can enhance players' motivation to improve health behaviors (Lieberman, 2001). Because exergames are video games that can be played with multiple people, it provides a means for socialization with peers. This is beneficial for older adults, whom often experience isolation from others or have decreased interaction with peers (Layne, et al., 2008). Exergames are being increasingly used in senior centers and retirement communities because of the social well-being benefits seen in older adults who participate in such activities (Rosenberg, et al., 2010). Older adult women participating in an exergame intervention program using the Wii® responded positively about the program's social effects (Wollersheim, et al., 2010). The women felt like they "got to know each other more" and they felt "closer" to each other. One woman mentioned that "in the [Wii] group, we were laughing" (Wollersheim, et al., 2010). Exergames allows participants to connect with the modern technology and world, no matter how young or old. The older adult women felt more connected with their grandchildren and felt more confident about using current technology after learning how to use the Wii®; they learned that "anyone can play it" (Wollersheim, et al., 2010). One individual stated that using the Wii® made her feel that she was "not outdated". Another said playing the Wii® "makes you feel as though you are not a lost race" (Wollersheim, et al., 2010).

Entertainment. Contrary to other exercise programs, exergaming provides entertaining video games to combine game play with significant physical exercise thereby creating a positive and fun atmosphere for older adult players. A study gathered qualitative feedback from older adults who had played Nintendo's Wii® video game for at a minimum of twelve weeks. From the feedback, the older adults had positive remarks, stating that learning and playing the Wii® were "satisfying" and they enjoyed the fact that the games were "fun and varied" (Rosenberg, et al., 2010). One older adult commented that it "challenged me to do better" (Rosenberg, et al., 2010). Another study that included only older adult women in a six week Wii® program had the following comment during a focus group, "I was having fun. I admit, it was good" (Wollersheim, et al., 2010).

Adherence. With a high attrition rate (50%) within three to six months of starting exercise programs by older adults, exergaming may be a good alternative to traditional exercise programs. Rosenberg et al. (2010) found that the 12-week program using the Nintendo's Wii® had a high rate of retention of 86% among the older adult participants. This was a positive participation rate and it was encouraging to have potentially found a means of exercising that older adults enjoy and adhere to.

Improved mental health. Older adults with depression are at particular risk for decreased physical activity in that they are less likely to find enjoyment in physical activity than those without depression. Therefore, they are more likely to stop exercising prematurely. Rosenberg et al. (2010) found that older adults with subsyndromal depression (SSD) who played Nintendo's Wii® showed improvement in depressive symptoms, mental health-related QOL, and cognitive function. Older adult women who exergamed thought the use of the Wii® helped stimulate them; they felt that the Wii® required them to use not only their body, but also their mind. They enjoyed that it made them learn something new and pushed them outside their comfort zone (Wollersheim, et al., 2010). The Wii®, along with other exergames, has the ability to stimulate new behavior (Wollersheim, et al., 2010).

Improved physical health. Exergames provide a means for improved muscular power. This improvement is thought to be important for functional status and the ability to perform

ADLs; this is specifically of value to older adults who experience a decline in these functions (Warburton, et al., 2007).

Use of the Wii[®] by older adults helps them obtain at least 30 minutes each day of light-moderate intensity activity (Graves, et al., 2010). This activity can provide health benefits in older adults, including a reduction in their risk for all cause-mortality, cardiovascular disease, and Type 2 diabetes (Graves, et al., 2010).

Older adults participating in exergaming activities increase their subjective physical health as well. Comments from the participants were positive after using the Wii[®]. One woman commented, “When you put [the Wii[®]] down, you can just walk a little bit farther, the aches and pains work, it loosened up the bones.” Still other women mentioned, “My body felt much better” and “it made my arm stronger”. Several of these women had limited mobility and felt they were unable to participate in any activity prior to the program. However, they found that the Wii[®] can still be played and enjoyed. One commented that “It’s been good...because there’s been no discrimination due to age, disabilities, or anything else” (Wollersheim, et al., 2010).

Theory-Based Health Programs

Effective health programs, including physical activity and fitness programs, use behavior change theoretical models as the basis of the intervention. Behavior change theories essentially provide the framework for the approach in the development of health promotion programs. The theory of choice of the program provides the foundation and back-bone for evidence-based programs by providing the guidance and support for planning, implementing, and evaluating a health program (Fertman & Allensworth, 2010). The theory selected by the program structures the intervention as well as helps recognize factors like knowledge, attitudes, beliefs, motivation, self-concept, and skills. Health is not static, but rather dynamic; hence, theories based on health programs are also dynamic. Therefore, there are several different theories and models available to the health field, depending on the health concerns, needs, and situation (Fertman & Allensworth, 2010). Two theories of interest include the Transtheoretical Model (TTM) and the Whole Person Wellness Model.

Transtheoretical Model

The TTM suggests behavior change occurs over time as a process of five stages rather than at one moment (Table 1). It utilizes individual decision-making processes as a basis to explain intentional behavior change. These stages (precontemplation, contemplation, preparation, action, and maintenance) are not unidirectional in that, depending on the behavior needed to be changed, individuals may regress in stages (Prochaska, Redding, & Evers, 1997).

Table 1. Stages of change within the Transtheoretical Model.

Stage	Definition
Precontemplation	Individuals do not believe a behavior change is needed and do not intend to change behavior in the foreseeable future
Contemplation	Individuals are aware of a problem and plan to change behavior within six months
Preparation	Individuals plan to make a change in the next 30 days
Action	Individuals have begun changes in behavior
Maintenance	Individuals who have maintained a behavior change for at least six months

Utilization. TTM transitions individuals through stages, therefore there are different processes of change that can be used to progress them through the different stages. Depending on the stage an individual is currently in, the process to move him through the stages must be tailored to fit his readiness to change. For example, a program informing participants in precontemplation stage on different ways to be physically active in order to prevent heart disease will be ineffective if they do not perceive themselves as being at risk for heart disease. Rather, it may be easier for a precontemplator to hear a suggestion to think about something instead of asking the person to move to action, which is currently the standard method of intervention, when he is not yet ready. It is suggested that in early stages, it is best to apply cognitive, affective, and evaluative processes to progress individuals through the stages, while in later

stages, people rely more on commitments, conditioning, environmental controls, and support for progressing through to maintenance (Prochaska, et al., 1997). Through a research survey conducted by Hildebrand and Neufeld, of the individuals who were at risk for health behaviors, 40% were in the precontemplation stage, 40% in the contemplation stage, and 20% in the preparation stage. In order for a program to recruit the most number of participants, the methods of recruitment must be proactive rather than reactive. Reactive methods are “action-oriented” and react only when potential participants respond (Hildebrand & Neufeld, 2009). It is important for programs to match the needs of the participants rather than expecting the participants to match the needs of a program (Prochaska, et al., 1997).

Effectiveness. TTM has been successfully implemented in several intervention studies. Most frequent behaviors addressed include smoking, diet, and physical activity in the setting of community-based programs (Prochaska, et al., 1997).

Several studies done for multiple problem behaviors have found that when compared to only action-oriented education materials or no treatment, stage-tailored health education materials have been shown to be more effective (Prochaska, et al., 1997). As more programs start to implement TTM into their method of behavior change, it is expected that programs targeted to a vast array of desired behavior changes will begin to see impactful changes on individuals and entire populations (Prochaska, et al., 1997).

Whole Person Wellness Model

While the term “wellness” is most often associated with physical health, the Whole Person Wellness Model is a behavior change model encompassing several components in addition to physical health (Kang & Russ, 2009). The first introduction to the term wellness was in 1961 by a Dr. Halbert Dunn, a physician. He determined wellness as a lifestyle approach for pursuing physical and psychological well-being. This definition was further expanded on by Dr. Bill Hettler who introduced a model with an holistic perspective on wellness that integrated six wellness dimensions, as shown in Figure 1 (Kang & Russ, 2009). These wellness dimensions include: physical, emotional, spiritual, intellectual, occupational, and social. Physical wellness recognizes the need for regular physical activity that encourages education about diet and nutrition; emotional wellness focuses on building relationships with others based on trust and

respect and encouraging the acceptance of one's feelings; spiritual wellness focuses on one's search for meaning and purpose in life; intellectual wellness works to stimulate one's mental thinking while expanding their knowledge and skills; occupational wellness recognizes the personal satisfaction one obtains through work and involving one's self in activities that interest him or her; and social wellness encourages one to contribute to his or her community and to better communicate with others (Kang & Russ, 2009). Each dimension contributes to the wellness of an individual and they work simultaneously to bring about behavior change.



Figure 1. Whole Person Wellness Model

Utilization. Several older adult programs use at least one of the six dimensions of wellness in their program. A survey taken of Oklahoma community centers found that 16% of the centers offered all six wellness dimensions to their older adults through programming (Kang & Russ, 2009). The wellness dimension offered most frequently was physical, with 85% of the centers offering programs targeting this dimension such as individual and group exercises focused on muscle strength and endurance, flexibility, coordination, and balance (Kang & Russ, 2009). The most common activity was the use of exercise equipment such as treadmills while other exercise included walking, dancing, exergaming, aerobics, and bicycling. Those offered the least, in decreasing order were social, spiritual, intellectual, occupational, and emotional

needs (Kang & Russ, 2009). Social wellness was achieved in programs through games like bingo and cards as well as gatherings with friends. Spiritual events included prayers and Bible readings. Intellectual activities that community center programs offered included participation in educational programs such as computers, word seeks, and travel (Kang & Russ, 2009).

Effectiveness. Due to the number of older adults who live alone in the United States, it is important that they remain physically, emotionally, spiritually, intellectually, occupationally, and socially healthy for independent living. The most important way to improve the health of older adults is by promoting their participation in wellness activities (Kang & Russ, 2009). Benefits to incorporating the Whole Person Wellness Model in program design for older adults includes an increased QOL, a longer and healthier life, social interaction, improved emotional and mental health, workforce participation, and remaining independent financially (Kang & Russ, 2009).

Summary

Older adults, a population which is on the rise in the United States, are not meeting the recommendations for regular physical activity. Many older adults need to be more physically active in order to maintain independence and prevent further development of chronic diseases. Those who participate in group physical activity programs, including exergaming activities, find it enjoyable and feel better afterwards, both physically and emotionally. However, little research has been done on assessing the change in fitness and subjective well-being of older adults after participating in an intergenerational exergaming physical activity within a group of their peers. A low-cost intergenerational physical activity program that is available to older adults who do not have readily available access to places of leisure exercise would be beneficial in determining whether the use of exergames as the main source of physical activity can demonstrate positive physical and emotional changes among older adults.

CHAPTER III: METHODOLOGY

Introduction

The Living Well through Intergenerational Fitness and Exercise (LIFE) Program was a pilot study for a community-based, intergenerational exergaming program for older adults. The goal of the LIFE Program was to provide evidence-based health promotion programming to older Iowans with an objective of determining the effects of the program on older adult health and subjective well-being. The research questions examined to what degree the LIFE Program 1) improved physical functioning and reduced the number of physical limitations (e.g ability to climb stairs), 2) improved functional fitness 3) improved self-reported physical activity, and 4) how the LIFE Program was perceived by the participants.

Due to the limited number of low-cost safe, physical activity resources such as gyms, Young Men's Christian Association (YMCA) facilities, or recreation and fitness centers in rural communities, the need for an exercise program targeting older adults in these areas was evident. The LIFE Program was designed for delivery in rural towns where congregate meal sites are open at least two times weekly. The expectation of the program was to improve the overall wellness of older adults age 60+. Seven congregate meal sites and/or senior apartments within central Iowa were identified and agreed to participate in the study. Within each site, three to 12 older adults participated in the program with two to three younger adult trainers (hence forth referred to as participants and trainers, respectively) on-site to lead the program. The LIFE Program spanned a length of 25 weeks with two main parts: the on-site exercise program (eight weeks) and newsletter intervention (16 weeks). The first eight weeks included the on-site program where trainers led the exergaming program to the participants. Meeting times were two times a week with one day in between the sessions. Both days included 30 minutes of physical activity using the Nintendo Wii® EA Active gaming system (60 minutes weekly physical activity). On the second day, an additional 30 minutes were spent playing interactive games together with the trainers to promote intergenerational interaction. These eight weeks included data collection (Weeks 1 and 8) thereby providing six complete weeks of physical activity. Following the on-site LIFE Program, each participant was mailed and received eight bi-monthly wellness newsletters (four nutrition/fitness, four cognitive/social) along with a rapid assessment of physical activity assessment bimonthly for 16 weeks. During these 16 weeks, the trainer-led

program was not conducted but the Wii[®] remained on-site. On-site leaders (trained by the trainers during the 8-week program) were encouraged to continue the program. Comprehensive surveys were administered during Weeks 1, 8, and 25. For participating in the study, participants received incentives at Weeks 2, 3, and 8. All study protocols were approved by the Iowa State University Institutional Review Board (Appendix A).

Program Design

Theoretical models. The basis of intervention for the LIFE Program included two theoretical behavior change models: Transtheoretical Model (Stages of Change) and the Whole Person Wellness Model. The Transtheoretical Model suggests behavior change occurs over time as a process of five stages (precontemplation, contemplation, preparation, action, and maintenance) rather than at one moment (Prochaska, Redding, & Evers, 1997). Precontemplation is when an individual does not believe a behavior needs to be changed; contemplation denotes a person is aware of a problem, and plans to change behavior within six months; Preparation is when an individual plans to make a change in the next 30 days; action occurs when an individual has begun making changes; and maintenance happens when an individual has maintained the behavior change for six months (Prochaska, et al., 1997). The Transtheoretical Model utilizes individual decision-making processes as a basis to explain intentional behavior change (Prochaska, et al., 1997). The Whole Person Wellness Model is a behavior change model, encompassing with a holistic perspective on wellness that integrates six wellness dimensions (physical, emotional, spiritual, intellectual, occupational, and social) (Kang & Russ, 2009). The LIFE Program focused on reaching four of the six wellness dimensions: physical (Wii[®] EA Active/newsletters), emotional (group setting/intergenerational), intellectual (interactive games), and social (group setting/intergenerational). Physical wellness recognizes the need for regular physical activity that encourages education about diet and nutrition; emotional wellness focuses on building relationships with others based on trust and respect and encouraging the acceptance of one's feelings; intellectual wellness works to stimulate one's mental thinking while expanding their knowledge and skills; and social wellness encourages one to contribute to his or her community and to better communicate with others (Kang & Russ, 2009). Each dimension contributes to the wellness of an individual and they work simultaneously to bring about behavior change.

Wii® Active game. The exergame selected for the LIFE Program was the Nintendo Wii® EA Active video game. The Wii® detects motion from the participants holding the Wii® remotes and nunchuks by a sensor bar attached to the Wii® console. This particular game allows players to follow a personal trainer on the screen. Encouragement and support is given to the players by the personal trainer throughout the training session. Two players can exercise with personal trainers at one time. Exercises consisted of both aerobic and upper and lower body strength training using resistant bands. Aerobic activities included walking and running in place, dancing, boxing, and the fundamentals of a variety of sports such as volleyball, basketball, and tennis.

An exercise physiologist designed a total of 12 different workouts, two for each week of the program (Weeks 1 and 2 as well as Weeks 7 and 8 contained the same workouts due to data collection during the first and last week). All the exercises in the workouts were individually and carefully selected to ensure appropriateness and safety for older adults (Appendix B). All the exercises chosen could be done sitting in a chair to accommodate those with disabilities and who were unable to stand for the entirety of the program. The activities gradually increased in time and difficulty over the eight week time period, with the first session timed at 13 minutes and the last session being 23 minutes. Exercise movements were repeated throughout the weeks to enhance familiarity. For each exercise, the virtual personal trainer on the screen demonstrated how to properly do each activity or exercise before the participants began doing the exercise themselves. As the exercises were repeated, these informative videos were skipped in order to fit the entire designed workouts into the thirty minutes allotted for the program.

On-site program. The LIFE Program was implemented at Site 1 one month prior to the launch of Sites 2 through 5. Sites 6 and 7 were conducted approximately two months after these programs. This was initially done due to scheduling. However, Site 1 experienced difficulties which led to additional “tip sheets” being created for the other sites. Tips given included: recommendations for solving Wii® technical troubleshooting problems, ways to achieve more meaningful interactions with the older adults during the interactive games and Wii® exercises, and general set-up procedures of the Wii®.

During the on-site program, an attendance sheet was available for the participants to sign his or her name. One attendance sheet was used weekly at each site and was kept on-site until

the end of the on-site program when a research team member picked up the attendance sheets to record participation and attrition rate. The participants marked if they were present for the first day of Wii® activities, second day of Wii® activities, and the second day for interactive games. Comments were made for why a participant had to leave early or did not attend a day. Those unable to complete the program to its entirety were recorded and the reason for attrition was also noted.

Each site was equipped with a Wii® Kit, which stored all the contents needed for the program. This included the Wii® console, projector (for larger picture), speakers, Wii® EA Active game, charging dock for the remotes, remotes and nunchuks (four each) for participants connected to the Wii®, resistant bands for all participants, leg straps (four) for participants connected to the Wii®, materials for the interactive games, and safety information. The kit was a footlocker with wheels in order to allow easy accessibility by the older adults after the completion of the on-site program. Following each session, the kit was packed and stored in a safe location on-site. A padlock was provided for sites where safety of the equipment was a concern (n=1). During the on-site program, the participants could not use the Wii® except for the designated on-site program time. However, other types of physical activity were encouraged on non-program days.

The Wii® EA Active game allowed two players to be connected to the Wii® at the same time with a split view screen for each participant. Each program day, two different participants were able to connect to the Wii® and use the Wii® remotes and nunchuks. Participants not connected stood behind those with the Wii® remotes and participated in the same exercises being shown on the screen by the virtual personal trainer. Extra resistant bands were provided in the Wii® Kit so all could do the exercises. Chairs were also provided so participants could sit to rest or to continue doing the exercises sitting down if they became too fatigued to stand. During the exercise time, the trainers supervised and helped the participants do the exercises correctly and safely. Notes were made if exercises were skipped or if participants could not finish all the exercises during the allotted session time.

On Day 2 of each week, a half hour was spent playing interactive games. These games, gathered from a variety of resources (Rohnke, 1993; Cain & Smith, 2002; Cain; Hammond & Cavert, 2003; Cavert & Sikes, 2002; Cummings, 2007; Unkrich), were intended for a group setting and designed to promote team building, problem solving, and communication skills

within the group. Different interactive games were taught and played each week (Appendix C). Interactive games consisted of introductory games similar to icebreakers, storytelling activities, and strategy and mind games. The primary reason the interactive game component was incorporated into the LIFE Program was to promote meaningful intergenerational interaction between the participants and trainers. Secondary reasons and benefits to including interactive games in the program were: 1) provide an alternative way for participants to be active; it demonstrated the multiple ways one can achieve activity in a day, which may not be the traditional exercises one thinks of and 2) contribute to the cognitive component of the program by recognizing the intellectual and social dimensions of the Whole Person Wellness Model within the games (Kang & Russ, 2009).

During the eight week program, participants interested in being an on-site leader (n=6) after the completion of the on-site program were instructed by the trainers throughout integrated training sessions. Three sites did not have participants willing to volunteer to be an on-site leader; these sites, therefore, had no on-site leader. For the sustainability of the program, the on-site leaders were encouraged to continue to lead the group after the trainers left. Two on-site leaders per site were preferred; however, more were allowed if there were more interested. Recruitment of the on-site leaders occurred through the on-site program beginning Week 2. Recruitment techniques included direct methods and were done during the program sessions. Flyers were also provided during the on-site program to participants. Any LIFE Program participant was eligible to become an on-site leader. The on-site leaders were asked to sign an additional consent form and were provided with 4.5 hours of total training. Trainers taught the on-site leader the basic assembling and disassembling of the Wii® and safety precautions. The on-site leader helped the trainers assemble the Wii® on Day 2 of Weeks 4 and 5. Each on-site leader also received a folder containing printed materials addressing the issues discussed during the training for reference. The on-site leader co-led the program with the trainers during Week 6 and during the last, full week of exercises (Week 7), the on-site leader led the program with the assistance of the trainer if needed. Each on-site leader received a LIFE Program t-shirt for identification purposes. On-site leaders were asked to complete an additional qualitative evaluation composed by the research team at the end of the study (Week 25) about their experience as a leader (Appendix D).

During Week 2, participants received a book of recipes (*Recipes and Tips for Healthy, Thrifty Meals*), published by the United States Department of Agriculture (United States Department of Agriculture, 2000). Participants also received the book *Exercise and Physical Activity*, published through the National Institute on Aging (National Institute on Aging, 2010) during Week 3. This physical activity book is targeted to older adults and includes physical activity ideas and tips for at-home use. At the completion of the on-site program (Week 8), each participant received the exercise DVD, “Exercise: A Video from the National Institute on Aging”. This exercise video followed and referred to the information provided in the physical activity book given to the participants in Week 3. The book and video were given to the participants to help them continue their progress of staying physically active. The entire Wii® Kit remained on-site after the completion of the on-site program for continued use by the older adults in the future. Additionally, the Wii® Sports and Wii® SportResort games were given to the sites at Week 25 for fun, new activities for the older adults to do together.

Newsletter intervention. Following the on-site program, participants received wellness newsletters for 16 weeks (Appendix E). These newsletters were designed to promote whole person wellness by incorporating information related to the wellness areas targeted in the Whole Person Wellness Model (Kang & Russ, 2009). The biweekly newsletters included four fitness/nutrition newsletters as well as four cognitive/social newsletters. Because these newsletters were sent in the mail alternatively, each month the participants received one fitness/nutrition newsletter and one cognitive/social newsletter. The physical wellness dimension of the Whole Person Wellness Model was addressed not only by the on-site program but also from the four fitness/nutrition newsletters. These newsletters emphasized the importance of regular physical activity while also encouraging nutrition and a healthful diet. Emotional, intellectual, and social wellness dimensions of the model were utilized in the four wellness newsletters that focused on keeping older adults active in their community and staying active cognitively through a variety of puzzles.

During the 16-week newsletter intervention, participants were encouraged to continue going to the program site to use the Wii®. The on-site leaders were trained to set up the Wii® and provide the leadership necessary to keep the participants motivated to continue their physical activity using the Wii®. To gauge the usage of the Wii® at the sites, Scan Disk (SD) storage

cards were kept in the Wii® console, which kept track of usage frequency. The SD storage cards were gathered at the end of the 25-week program by a research team member. Using the storage cards allowed the research team to view how many days and on what days the Wii® was used as well as for how long it was used on each day.

Recruitment

Site recruitment. Five rural sites and two non-rural sites within central Iowa were selected. Two sites were held at Housing and Urban Development (HUD) qualified senior apartments. The other five sites were held in the same location as the congregate meals. Sites in the non-rural areas consisted of participants who were at increased health risk based on limited financial resources. In addition to being located in rural communities, the congregate meal sites offered congregate meals at least two times during the week with one day in between (e.g. Tuesday and Thursday or Monday and Wednesday), had ample and safe accommodations for the LIFE Program (e.g. open floor space for movement), and had congregate meal site directors willing to host the program during the 8-week on-site program. Participation in meals at the sites ranged from 5 to 20 participants. Congregate meal sites were held at community centers (2 sites), senior centers (3 sites), or apartment complexes (2 sites). Senior apartments were selected to provide a variety of environments in the study. Apartments were low-income housing, making all tenants eligible for the congregate meal program.

During site selection, information about the design of the program was provided to the congregate meal site director or apartment manager and tentative times and dates for the program at the sites were scheduled. Directors or managers had no responsibilities in running the LIFE Program besides supporting the program, informing the meal participants or tenants about the program, providing a safe and secure place for the footlocker kit containing the Wii® equipment and accessories, and reporting any problems related to the program to the research team. All other responsibilities were given to the trainers or research team. Following the LIFE Program, each site was granted all the equipment and accessories to keep for continued use by the older adults at the site.

Older adult participant recruitment. Recruitment began approximately two months prior to program start for each site. Recruitment involved a convenience and snowball sample of rural

older adults. Prospective participants included those who met the following criteria: 1) 60+ and eligible to participate in congregate meal sites, 2) literate, 3) able to participate as determined by the physical activity readiness questionnaire and/or physician permission, and 4) able to complete questionnaires at three time points (Weeks 1, 8, and 25).

Recruitment techniques included both indirect and direct methods, which resulted in a total of 100 interested participants. Indirect methods consisted of articles in the local newspaper of each site's town (or the newspaper most often read by the residents if no town newspaper was available), flyers posted around the towns in locations such as city halls, libraries, and churches, and emails and/or phone calls sent to churches or local community organizations and clubs.

Indirect methods resulted in the recruitment of 44 prospective participants.

Direct methods resulted in 56 individuals showing interest in the LIFE Program following in-person presentations given at the site. For those sites that were congregate meal sites, presentations were given during the meal time on the most popular day identified by the congregate meal site manager in order to reach the greatest number of people at the site. For those sites that were not at congregate meal sites, other times were arranged for when most older adults would be free to meet. Additional visits were made to coffee hours, study groups, and senior lunch and learn hours in order to reach other older adults in the rural communities not attending the congregate meals. During each visit, the Wii[®] was assembled and the older adults were encouraged to try it to get a glimpse of what the program would be like. This also helped diminish the fears some of the older adults had about the technology or the difficulty of using the Wii[®].

For all interested participants, a packet was either mailed to his or her home or given in person. Each packet included a generalized letter explaining the LIFE Program study, two consent forms (one for the older adult to keep for his/her own records and one to sign and return to the research team on the first day of the program) (Appendix F), a Physical Activity Readiness Questionnaire (PAR-Q) (Appendix G), and a medical authorization form (Appendix G) in an envelope to be given to the health care provider of the older adult, if needed. The PAR-Q is a brief survey consisting of seven, yes/no questions (American College of Sports Medicine, 2007). Questions identified if it was safe for the participant to participate in the program. If one or more questions were answered "yes" by the older adult, or if he/she was older than 69 years, the older adult was required to receive health provider permission for participation in the program. The

research team did not seek access to the medical records of the participants or initiate contact with the health care providers. This was to ensure the medical confidentiality of the participants. The older adult participant returned his/her signed consent form, PAR-Q, and permission form from their health care provider if needed to the research team on the first day of the on-site LIFE Program. Participation in the program was not allowed until the PAR-Q and/or permission forms were returned. Sixty-eight of the original 100 older adults interested in the program came to the first day of the program and were eligible to participate. Of these 68 participants, 46 completed the program, leading to a 67.6% completion rate. Within each separate site, there was an attrition rate of 36% (Site 1), 57% (Site 2), 42% (Site 3), 0% (Site 4), 20% (Site 5), 30% (Site 6), and 25% (Site 7). Participants who did not complete the program or the questionnaires at Weeks 8 and 25 were not included with the data analyses. Only data collected from participants are presented; however, trainer recruitment and training is discussed.

Younger adult trainer recruitment. University students (ages 19-26 years) were recruited to serve as the younger adult on-site program trainers. Recruitment took place about four months prior to program start. A convenience and snowball sample was used for the younger adults as well. Trainers had to meet the following criteria to be able to participate: 1) age 16+, 2) complete a one-day training workshop, 3) be available eight consecutive weeks during the on-site program, 4) able to lead an on-site physical activity program twice weekly for two hours each visit, 5) have reliable transportation, 6) participate in a follow-up focus group about their experience, and 7) complete questionnaires at three time points (Weeks 1, 8, and 25). If the trainer was less than 18 years old, parental/guardian permission was required before participation was allowed (no trainers required this). Through indirect and direct recruitment, a total of 48 interested trainers were identified, 18 agreed to participate. Indirect recruitment consisted of posted flyers around campus in visible and frequently visited locations by the eligible participants, word of mouth, an article explaining and promoting the program in the university newspaper, and mass emails sent student-centered listserves. Additionally, to increase the level of interest of college students wanting to participate, trainers were given the option of receiving one-hour of research credit through the Gerontology program. This involvement was decided between the trainer and his/her advisor. Research team members were not involved in evaluating the students for course credit. Direct recruitment involved presentations given to classes,

targeting kinesiology, gerontology, food science and human nutrition, and human development and family and consumer sciences classes as well as local 4-H clubs, high schools, and local volunteer centers. A total of 18 trainers completed the eight hour training workshop required to be able to participate in the program. This training workshop followed an agenda focused on training the younger adults how to: use the Wii[®], assist older adults when leading the program, play and lead the interactive games, and apply safety precautions when working with older adults (Appendix H). All trainers were read aloud a consent form stating their involvement in the study and they signed the form before participation in the program was allowed (Appendix F). All trainers kept a copy for their own records. Trainers received a LIFE Program t-shirt to wear on-site for identification purposes as well as a folder containing printed materials addressing the issues discussed during the workshop. Data collected from trainers are not presented here.

Data Collection

A research team of five (4 faculty and 1 graduate student) plus 18 trainers were trained on how to gather and document data collected on-site. Data were collected at three different time points throughout the program, including Week 1 (before program began), Week 8 (completion of the on-site program), and Week 25 (completion of the newsletter intervention). During Weeks 8 and 25, participants were also asked to complete a qualitative evaluation composed by the research team about their experience in the LIFE Program (Appendix D).

The older adults determined eligible to participate based on his or her PAR-Q and signed consent forms were given comprehensive questionnaires to complete at three time points. Participants were given as much time as needed to fill out the questionnaires and were allowed to leave questions blank they did not feel comfortable answering. The questionnaire took approximately 30-60 minutes to complete. Assistance from a research team member was given to those who did not understand a question or who had difficulty reading the questions due to poor eye sight. All participants' information was coded numerically to ensure confidentiality. All data were kept in a secure location.

Participants were called prior to Weeks 8 and 25 to encourage them to come to the on-site program location to complete his or her questionnaire. All data were collected from the participants within two weeks of completion of the on-site program.

The questionnaire consisted of general, sociodemographic background questions and validated assessments to assess changes in functional fitness and limitations and physical activity participation (Appendix I).

Sociodemographic assessment. The pre-questionnaire contained seven questions pertaining to the general, sociodemographic information of the participant. These questions asked for information pertaining to: age, sex, ethnicity, marital status, general health, living arrangements, and frequency of interaction with younger adults. All questions were multiple choice containing a range of options, except for the age which was written in by the participant.

Functional limitations assessment. Functional limitations were assessed using the Late Life Function Instrument (LLF) and the Late Life Disability Instrument (LLD) (Jette, et al., 2002).

The LLF questionnaire is a validated survey containing 32 questions pertaining to three different domains: upper extremity function (items reflecting activities of the hands and arms), basic lower extremity function (items reflecting activities involving standing, stooping, and fundamental walking activities), and advanced lower extremity function (items reflecting activities that involve a high level of physical ability and endurance) (Jette, et al., 2002). Each question was related to the ability and ease in which the participant could perform various activities, ranging from such activities as going up and down a flight of stairs using a handrail, running half a mile or more, or pouring liquid from a large pitcher. The questions were ranked by the participant by how much difficulty he/she had doing the activities. Numbers ranged from one “cannot do” to five “none”. Scoring of this survey included scores for the three separate domains as well as the overall function score. Raw scores were determined by adding up the values for the questions pertaining to each domain and the values for all the questions for the overall function of the participant. Using the scoring guide, the raw scores were transformed to a scaled score (0-100) in order to have all the domain scores and overall score on a similar metric. The transformed scores are based on a one-parameter Rasch model, which transform the raw scores into a linear scale. If an answer was left blank by the participant, an estimated score was determined by averaging the participant’s scores from the domain of the missing question. For the seven participants who required use of a device for assistance (e.g cane, walker), a revised

version of the LLF questionnaire was given, containing an additional eight questions. These participants had a different scoring guide that was provided and used (Jette, et al., 2002). The three domains were still included as well as an overall function score of the participant. If any part of the LLF was not completed by the participant, this data was not used and no score was calculated.

The LLD questionnaire contained 32 questions assessing the disability of the participant (Jette, et al., 2002). The LLD evaluated self-reported frequency of performing life tasks as well as the limitation in capability of performing those life tasks. The 16 frequency questions asked the participant how often he or she performed a particular task. The participant answered these questions by ranking the question one “never” to five “very often”; the higher the score, the less disabled the participant was for that activity. The 16 limitation questions asked to what extent the participant felt limited to doing the same tasks asked for the frequency questions. The participant answered these questions by ranking his or her limitation one “completely” to five “not at all”; the lower the score, the more limited the participant was in doing that particular activity. When determining the degree of limitations for an activity, the participant was encouraged to consider all factors that may influence limitations, including both personal factors (health, physical, or mental energy) and environmental factors (transportation, accessibility, or socio-economic conditions). Within the frequency and limitation dimensions are role domains. Those within the frequency dimension include: social role (reflects the frequency of performing various social and community tasks) and personal role (reflects the frequency of performing various personal tasks). The role domains within the limitations dimension include: instrumental role (reflects limitation in activities at home and in the community) and management role (reflects limitation in organization or management of social tasks that involve minimal mobility or physical activity). The raw scores of each dimension and role domains of the disability questionnaire were calculated by totaling the item scores from each. These scores were transformed to scaled scores (0-100) in order to have all scores on a similar metric. The transformed scores were based on a one-parameter Rasch model, which transformed the raw scores into a linear scale. If any part of the LLD was not completed by the participant, this data was not used and no score was calculated.

Functional fitness assessment. The functional fitness of each older adult participant was measured using components of the Senior Fit Test (Rikli & Jones, 2001). These components included the chair stand test, the back scratch test, and the hand grip test using a handgrip dynamometer (in that order). While the participants worked on the questionnaires individually at tables, one trainer for each site took one participant at a time to the testing area. The same trainer conducted the measurements for every participant at a site for Weeks 1 and 8 in order to minimize inter-rater variability. A research team member conducted the follow-up Senior Fit Test due to the study design.

The chair stand test was used to assess lower body muscular endurance. This test was done using a standard, armless chair that was 17 inches from the floor. The chair was set against a wall to prevent the chair from moving back while the participant was rising. The participant began the test by sitting on the chair with his or her arms crossed in front of the chest. The participant was timed for 30 seconds. During this time, the participant was directed to stand up and sit back down as many times as possible. The total number of times the participant stood up was recorded. A participant who was in the process of standing up when time was up was granted this as a stand. The trainer counted the number of times the participant could stand up from the chair using a standard tally counter and kept time using a stop watch.

The back scratch test assessed flexibility of the older adult participants. For this test, the participants were instructed to try to touch their index fingers together behind the back by reaching over the shoulder and under the elbow. For example, the participant reached with the right hand over the right shoulder and down the back between the shoulder blades. At the same time, the participant placed the left hand behind the back and reached up, trying to touch the fingers. This was again done for the participant's left hand as well. While the participant was stretching, the trainer used a standard, 12-inch ruler to measure the gap between the right and left middle fingers. If the participant could reach the fingertips, this was recorded as zero inches. If the participant could overlap his or her hands, the distance of overlapping was recorded as a negative number. The participants performed the stretch on each side two times and the average of the two measurements was used. Participants were allowed to "warm up" before actual measurements were recorded. "Crawling" of the fingertips down or up the back was also allowed to try to help reach the fingertips. Participants unable to stretch their arms behind their back or had sore shoulders were not given any value.

The hand grip test assessed the muscular strength of the participants. The handgrip dynamometers used at all sites were Jamar Hand Dynamometers (Bolingbrook, IL). Handles of the dynamometer were set to the same distance for all sites. The participants were instructed to hold the dynamometer with the dial facing straight ahead of them, their arm bent at a right angle, and their elbow by the side of the body. The wrist band attached to the dynamometer was secured on the participant in case the instrument was dropped. Before each use of the dynamometer, the trainer reset the dial so the force was at zero pounds. When ready, the participant squeezed the dynamometer with maximum effort, using no other body movement. Force was recorded in pounds. Participants tested their handgrip strength two times for each hand and the average of the two times for each side was used.

Age group percentile norms were determined and used to score the chair stand and back scratch test in order to make an accurate and fair comparison between the participants who ranged in age groups and gender (Rikli & Jones, 2001). Hand grip strength was scored using the number of pounds recorded from the dynamometer during testing.

Self-reported physical activity. The LIFE Program assessed changes in self-reported physical activity participation by using the Cancer Prevention Research Center's Stages of Change for Physical Activity Questionnaire to monitor changes in the stages (precontemplation, contemplation, preparation, action, maintenance) from Week 1 to Weeks 8 and 25 (Cancer Prevention Research Center, 2010). Within the Stages of Change for Physical Activity Questionnaire the question "Do you currently engage in regular physical activity?" was included. "Regular physical activity" was defined to the participants as physical activity "done for 30 minutes at a time (or more) per day, and be done at least four days per week". It is recognized that this definition of physical activity varies slightly from the current ACSM recommendations of at least 30 minutes of moderate-intensity activity per day, five or more times a week. The Stages of Change for Physical Activity Questionnaire also stated that the intensity did not have to be vigorous, but needed to increase one's heart rate and/or breathing level. This question was used to determine if participants were physically active at Weeks 1, 8, and 25.

Subjective health. Changes in perceived well-being were assessed qualitatively using the evaluations participants completed during Weeks 8 and 25. These evaluations pertained to the

LIFE Program in order to receive feedback from the participants. Questions asking what aspects the participants liked best and least about the on-site LIFE Program as well as what their perceived positive and negative changes made were in their daily routine were used from the evaluation to gather comments from the participants concerning improvements made in their subjective health and likes or dislikes from the exergaming program.

Data Analysis

Analysis of data was conducted using the Statistical Package for Social Sciences for Windows (SPSS for Windows, version 17.0, 2008). Demographic information and qualitative data were analyzed with descriptive statistics. All other collected data were analyzed quantitatively. One-way ANOVA was used to determine differences between age, self-reported health status, and attendance at Week 1. ANCOVA was used to control for health status in measures when significant differences at Week 1 were found. For all other measures of the Senior Fit Test, repeated measures ANOVA was used to assess changes over time. Cochran's Q was used to assess changes in self-reported physical activity over the three time points. Significance was determined at $p \leq 0.05$ for one-way and repeated measures ANOVA. A Bonferroni p-value of $p \leq 0.0167$ was used for Cochran's Q. Only participants who completed a questionnaire at each time point were included.

CHAPTER IV: COMMUNITY-BASED EXERGAMING PROGRAM INCREASES PHYSICAL ACTIVITY AND SUBJECTIVE HEALTH IN OLDER ADULTS

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Abstract

Background. Physical inactivity among older adults is a growing public health issue that, if not addressed, will lead to increased incidence of chronic disease and disability. Exergaming is an innovative strategy to improve rural-residing older adults' fitness.

Methods. This crossover design study examined the impact a 25-week exergaming program for rural-residing older adults had on physical activity participation and subjective health. The program met twice weekly (60 minutes of Wii® EA Active total) for eight weeks. The remaining 16 weeks participants received intervention newsletters. Participants completed readiness-to-change questionnaires (Weeks 1, 8, and 25) and qualitative evaluations (Weeks 8 and 25). Data were analyzed using Statistical Package for Social Sciences for Windows (version 17.0).

Results. Forty-six older adults completed the program (67.6% completion rate). Significant increase in physical activity participation was noted among participants who originally reported being inactive at baseline (Week 8 to 25: $p=0.014$; Week 1 to 25: $p=0.001$). Being physically active and improved wellness were the most reported perceived positive changes with very few to no reported negative perceived changes. The best-liked features indicated were the physical activity and socialization.

Conclusions. These results suggest an exergaming program is an effective strategy in increasing physical activity in older adults who were previously sedentary, increasing socialization, and increasing subjective health in rural-residing older adults.

Introduction

Due to advancements in medical technology and the aging baby boomer generation, the older adult population is growing rapidly. Currently 13% of the United States population is age 65 years and older (United States Census Bureau, 2011a). This is only expected to increase in the coming years to nearly 20% of the population by 2030 (United States Census Bureau, 2011a). However, the amount of physical activity these adults participate in has not followed a similar trend. Fewer than five percent of older adults meet the current Centers for Disease Control (CDC) physical activity recommendations (Rosenberg, et al., 2010). According to the CDC and the 2010 Dietary Guidelines for Americans, an inactive individual is defined as one not engaging in at least 150 minutes of moderate-intensity physical activity every week or 75 minutes of vigorous-intensity physical activity every week (CDC, 2011). Slightly different recommendations are provided by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA), which state adults should take part in a minimum of 30 minutes of moderate-intensity aerobic physical activity on five days each week or at least 20 minutes of vigorous-intensity aerobic activity on three days each week (ACSM, 2007). It is estimated that 33% of men and 50% of women age 75 years and older engage in no physical activity (Hughes, et al., 2005).

Physical activity is a key modifiable behavior for improving numerous physical health conditions and functioning in older adults (Rosenberg, et al., 2010). Participating in regular physical activity prevents several chronic diseases and improves physical fitness, strength, flexibility, and balance. These are all necessary components in maintaining independence, improving health-related quality of life (QOL), and increasing performance in activities of daily living (ADLs) (Dionigi, 2007). Dionigi (2007) showed older adults who participated in 12 weeks of physical activity had improved strength, balance, coordination, and fitness, which the older adults thought had a positive effect on their ability to carry out “normal things” associated with daily living (Dionigi, 2007).

Barriers to physical activity and exercise programs inhibit older adults from participating in regular physical activity, thereby, preventing them from realizing the benefits associated with being physically active. Barriers include lack of adherence, environment, low self-efficacy, lack of knowledge to feel confident in exercising alone, and financial constraints (Dionigi, 2007;

Dorgo, Robinson, & Bader, 2009; Hildebrand & Neufeld, 2009; Hughes, et al., 2005; Rosenberg, et al., 2010; Shores, West, Theriault, & Davison, 2009).

Physical activity programs targeted specifically for older adults can help reduce the aforementioned perceived barriers and increase the opportunities available for them to be physically active (Layne, et al., 2008). Older adult specific physical activity programs provide the guidance and supervision needed to help older adults properly exercise and gain knowledge in a non-intimidating and friendly environment (Dorgo, et al., 2009). A way to promote physical activity and “active aging” is through the incorporation of intergenerational activity (Butts & Chana, 2007). Intergenerational programs create an opportunity to integrate the generations together and promote impactful and meaningful relationships that is often lacking (Kaplan, Liu, & Radhakrishna, 2003).

Exergaming, video gaming with exercise, is a new means of physical activity that is just now being realized as a valid way to meet the physical activity recommendations for all age groups. It is an activity that focuses on the fun of video gaming while also gaining the benefits physical activity has to offer. Use of the Wii® by older adults can help them obtain at least 30 minutes daily of light intensity activity (Graves, et al., 2010). This activity can provide health benefits in older adults, including a reduction in their risk for cardiovascular disease and Type 2 diabetes (Graves, et al., 2010).

While little research has been done on exergaming programs for older adults, exergames are being increasingly used in senior centers and retirement communities because of the socialization it provides. Therefore, this pilot study evaluated a community-based exergaming program using the Nintendo Wii® EA Active game at seven different rural locations for adults age 60 years and older to assess if exergaming improved 1) physical activity participation in older adults and 2) subjective health among participants after completing the program.

Methods

Program design

The Living (well through) Intergenerational Fitness and Exercise (LIFE) Program was a cross-over designed, pilot study for a theory- and community-based, intergenerational exergaming program for older adults (n=46). The basis of intervention for the LIFE Program included two theoretical behavior change models: Transtheoretical Model and the Whole Person

Wellness Model. The Transtheoretical Model suggests behavior change occurs over time as a process of five stages (precontemplation, contemplation, preparation, action, and maintenance) rather than at one moment. It utilizes individual decision-making processes as a basis to explain intentional behavior change. The LIFE Program targeted those in contemplation through preparation and sought to move the participants into action or maintenance. The Whole Person Wellness Model is a behavior change model, encompassing a holistic perspective, on wellness that integrates six wellness dimensions (physical, emotional, spiritual, intellectual, occupational, and social). The LIFE Program focused on reaching four of the six wellness dimensions: physical, emotional, intellectual, and social.

The LIFE Program spanned a length of 25 weeks with two main parts: the on-site program (eight weeks) and intervention newsletters (16 weeks). The first eight weeks included the on-site program where younger adult trainers (henceforth referred to as trainers) led the Wii® program to the older adults (hence forth referred to as participants). Trainers (n=18) received extensive training workshop (8 hours) prior to the start of the on-site program on program delivery and safety precautions. Meeting times for the on-site program were two days weekly with one day in between the sessions. The on-site program was conducted at seven sites (five congregate meal sites, two senior centers). Within each site, 3-18 older adults participated in the program with 2-3 trainers on-site to lead the program. Participants signed an attendance sheet each day of the program to record participation. Each site was equipped with a Wii® Kit, which stored all the contents needed for the program, including the Wii® console, projector (to allow for larger picture), speakers, Wii® EA Active game, and necessary accessories.

The exergame program selected for the LIFE Program was the Nintendo Wii® EA Active video game. The Wii® detected motion from the participants holding the Wii® remotes and nunchuk by a sensor bar attached to the Wii® console. This particular game allowed players to follow a virtual personal trainer on the screen. For each exercise, the virtual personal trainer on the screen demonstrated how to properly do each activity or exercise before the participants began doing the exercise themselves. As the exercises were repeated, these informative videos were skipped in order to fit the entire designed workouts into the thirty minutes allotted for the program. The trainers supervised and helped the participants do the exercises correctly and safely. Two players could exercise with the virtual personal trainers at one time; those who were not connected stood behind those with the Wii® remotes and participated in the same exercises.

All participants were provided with resistance bands for the needed exercises. An exercise physiologist designed a total of 12 different workouts, two for each week of the program (Weeks 1 and 2 as well as Weeks 7 and 8 contained the same workouts due to data collection during the first and last week). Exercise movements were repeated throughout the weeks to enhance familiarity. All exercises in the workouts were handpicked and carefully selected to ensure appropriateness and safety for older adults. Chosen exercises could be done sitting in a chair to accommodate for those with disabilities and who were unable to stand for the entirety of the program. The activities gradually increased in time and difficulty over the eight week time period, with the first session timed at 13 minutes and the last session going for 23 minutes. Exercises included aerobic activity and upper and lower body strength training using resistant bands. Aerobic activities included walking and running in place, dancing, boxing, and the fundamentals of a variety of sports such as volleyball, basketball, and tennis. Both days included 30 minutes of activity using the Wii®.

On Day 2, participants and trainers played interactive games together for an additional 30 minutes. These consisted of introductory games similar to icebreakers, storytelling activities, and strategy and mind games. The interactive games, gathered from a variety of resources, were intended for a group setting and designed to promote team building, problem solving, and communication skills within the group.

These eight weeks encompassed the data collection days, which included the first and last weeks of the designated on-site period, providing six complete weeks of physical activity. For participating in the study, participants received a cookbook (Week 2), *Exercise and Physical Activity* book (Week 3) (National Institute on Aging, 2010), and “Exercise: A Video from the National Institute on Aging” DVD (Week 8) (National Institute on Aging, 2010).

Participants interested in being an on-site leader (n=6) to lead the program after the completion of the 8-week on-site program were instructed by trainers through integrated training sessions throughout the on-site program to sustain the program. Trainers taught the participants on the basic assembling and disassembling of the Wii® and safety precautions. To be an on-site leader, the participant was required to sign a consent form and complete an additional qualitative evaluation at the end of the study (25 weeks) about their experience as a leader. All study protocols were approved by the Iowa State Institutional Review Board. The study was

sponsored by The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

Newsletter intervention. Following the 8-week on-site program, participants received wellness newsletters biweekly for 16 weeks. Designed to promote whole person wellness, the newsletters included four fitness/nutrition newsletters and four cognitive/social newsletters. The fitness/nutrition newsletters offered ways to create a healthy plate, similar to the MyPlate icon which was released after the launch of the program, and at-home exercising and stretching suggestions. The cognitive/social newsletter included mind games and ways to remain cognizant. In addition to the newsletters, participants received a Rapid Assessment of Physical Activity (RAPA), a questionnaire consisting of nine, brief questions. These were sent in order to assess the levels of activity individuals were participating in every other week for 16 weeks. Participants were given a self-addressed, stamped envelope to mail the completed RAPA forms back to the research team. During this 16-week time period, participants were encouraged to continue using the Wii® on-site. Wii® usage at the sites was recorded and stored using Scan Disk (SD) storage cards.

Recruitment

Site recruitment. The LIFE Program was designed for delivery in rural towns where congregate meal sites are held at least two times weekly. Five congregate meal sites and two senior apartments in rural Iowa agreed to participate. They received the Wii® Kit at the end of the study period as well as the Wii® Resort and Wii® SportsResort games.

Participant recruitment. Recruitment involved a convenience and snowball sample of rural-residing older adults. Prospective participants included those who met the following criteria: 1. age 60 years and older and eligible to participate in congregate meal sites, 2. literate, 3. able to participate as determined by the physical activity readiness questionnaire and/or physician permission, and 4. able to complete questionnaires at multiple time points (Week 1, 8, and 25). Direct and indirect methods of recruitment were conducted. Participating older adults were required to sign a consent form, complete the Physical Activity Readiness Questionnaire

(PAR-Q), and provide a signed medical authorization form from their health care provider, if needed per the PAR-Q (American College of Sports Medicine, 2007).

Data collection

Data collection was taken at three different time points throughout the program, including Week 1 (before program began), Week 8 (completion of the on-site program), and Week 25 (completion of the newsletter intervention) by trained personnel. During Weeks 8 and 25, participants also completed a qualitative evaluation regarding their experience in the LIFE Program.

The questionnaire consisted of sociodemographic background questions and reliable, valid assessments to assess self-reported physical activity participation. Sociodemographic background questions pertained to age, sex, ethnicity, marital status, general perceived health, living arrangements, and frequency of interaction with younger adults.

Self-reported physical activity participation was assessed using the question “Do you currently engage in regular physical activity?” from the Cancer Prevention Research Center’s Stages of Change for Physical Activity Questionnaire (Cancer Prevention Research Center, 2010). “Regular physical activity” was defined to the participants as physical activity “done for 30 minutes at a time (or more) per day, and be done at least four days per week”. It also stated the intensity did not have to be vigorous, but needed to increase his or her heart rate and/or breathing level. It is recognized that this definition of physical activity varies slightly from the current ACSM recommendations of at least 30 minutes of moderate-intensity activity per day, five or more times a week (ACSM, 2007).

Evaluations, given at Weeks 8 and 25, included questions pertaining to perceived positive and negative changes made because of the program and their best- and least-liked features of the LIFE Program. Participants were able to provide more than one response for the questions. These comments provided qualitative information regarding the improvements perceived by the older adults from the exergaming program.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences for Windows (SPSS for Windows, version 17.0, 2007). Demographic information and qualitative and RAPA data

were analyzed with descriptive statistics. One-way analysis of variance was used to determine differences between age, self-reported health status, and attendance at Week 1. Cochran's Q was used to assess changes in self-reported physical activity over the three time points. Significance was determined at $p \leq 0.05$ for one-way ANOVA. A Bonferroni p-value of $p \leq 0.0167$ was used for Cochran's Q. Only participants who completed a questionnaire at each time point are included.

Results

Demographics

Of the 100 interested older adults, 68 started the program; 46 completed (67.6% completion rate). Reasons for attrition included: 1. health (n=9), 2. limited time (n=3), 3. participation in other exercise classes (n=2), 4. moved away (n=1), or 5. unknown (n=6). The majority of participants were female (87%), Caucasian (100%), and widowed (52%) with an average age of 75.3 years (Table 1).

Table 1. Participant sociodemographic baseline data

	Number ^a	Percent
Age^b (years)	75.3	60-92
Gender		
Male	6	13.0
Female	40	87.0
Ethnicity		
Caucasian	46	100
General health		
Very poor	0	0
Somewhat poor	4	8.7
Average	14	30.4
Somewhat good	17	37.0
Very good	11	23.9
Marital status		
Single, never married	3	5.8
Married	17	32.7
Divorced	5	9.6
Widowed	27	51.9
Living arrangement		
Apartment or home	37	80.4
Independent &/or Assisted Living Facility	5	10.9
With Adult Children	1	2.2
Other	3	6.5
Contact with youth in a day		
Never	14	26.9
Occasionally	32	61.5
Several times a day	6	11.5

^a Total number of participants=46; ^b Data provided are mean and range

Physical Activity

There was a significant increase (Weeks 8 to 25: $p=0.014$; Weeks 1 to 25: $p=0.001$) in physical activity participation at the end of the 25-week program among participants who originally reported being inactive at the start of the program (Week 1) (Figure 1). Of the 21 participants who self-identified as physically inactive at baseline, five were active by Week 8 and six additional were active by Week 25. No participants regressed back to being inactive

after Week 8. By Week 25, there was an overall 22% increase in self-reported physical activity participation by all participants; however, this overall increase was not significant. ANOVA analysis indicated self-reported health status, age, and attendance did not influence the changes noted. Additionally, no significant differences between the sites in seasonality and trainer influence were identified.

Of the 24 participants who had a 100% return rate for the RAPA during the 16-week newsletter intervention, the majority of participants ($n=9.4$ [30.7%]), on average, were scored as “active”, indicated by completing 30 minutes or more of moderate physical activity, five days a week; examples of this type of activity that were provided to the older adults on the RAPA included fast walking, swimming gently, strength training, and aerobics class.

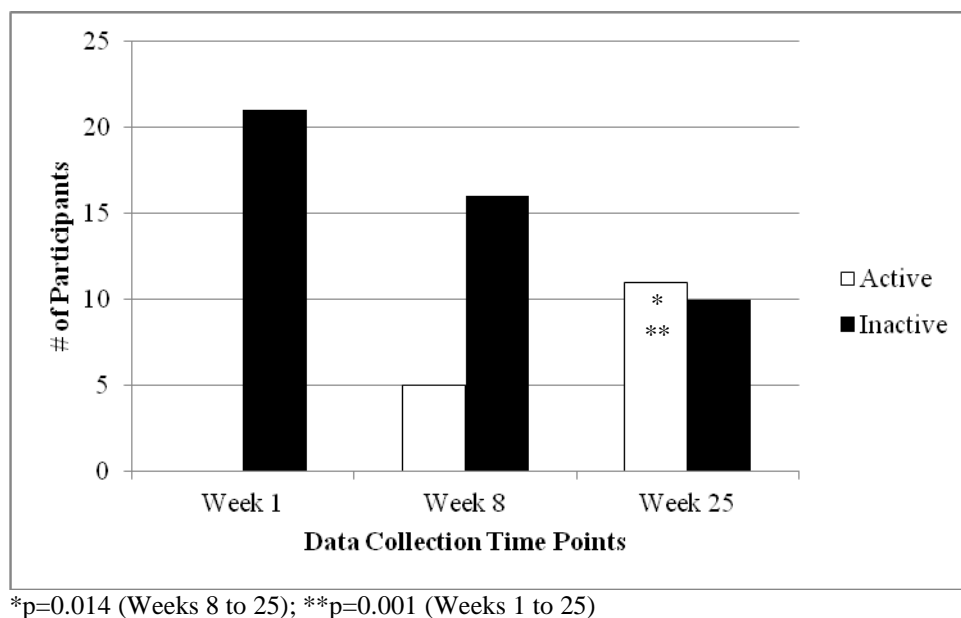


Figure 1. Change in self-reported physical activity for those self-identified as inactive at Week 1 ($n=21$).

Subjective health

All participants completed program evaluations at Weeks 8 and 25. Thirty-nine listed at least one best-liked feature at Week 8 and 36 at Week 25. The LIFE Program received positive feedback from participants. Results revealed the physical activity and socialization to be the

best-liked features (Figure 2). Other popular responses included the trainers, increased fitness, and Wii® equipment.

Although most people did not report a least-liked feature, the negative aspects of the LIFE Program most commonly reported were the technical difficulties and the exercise (Figure 2). Other reported least-liked features included: interactive games, schedule/location conflicts, and the short duration of the program.

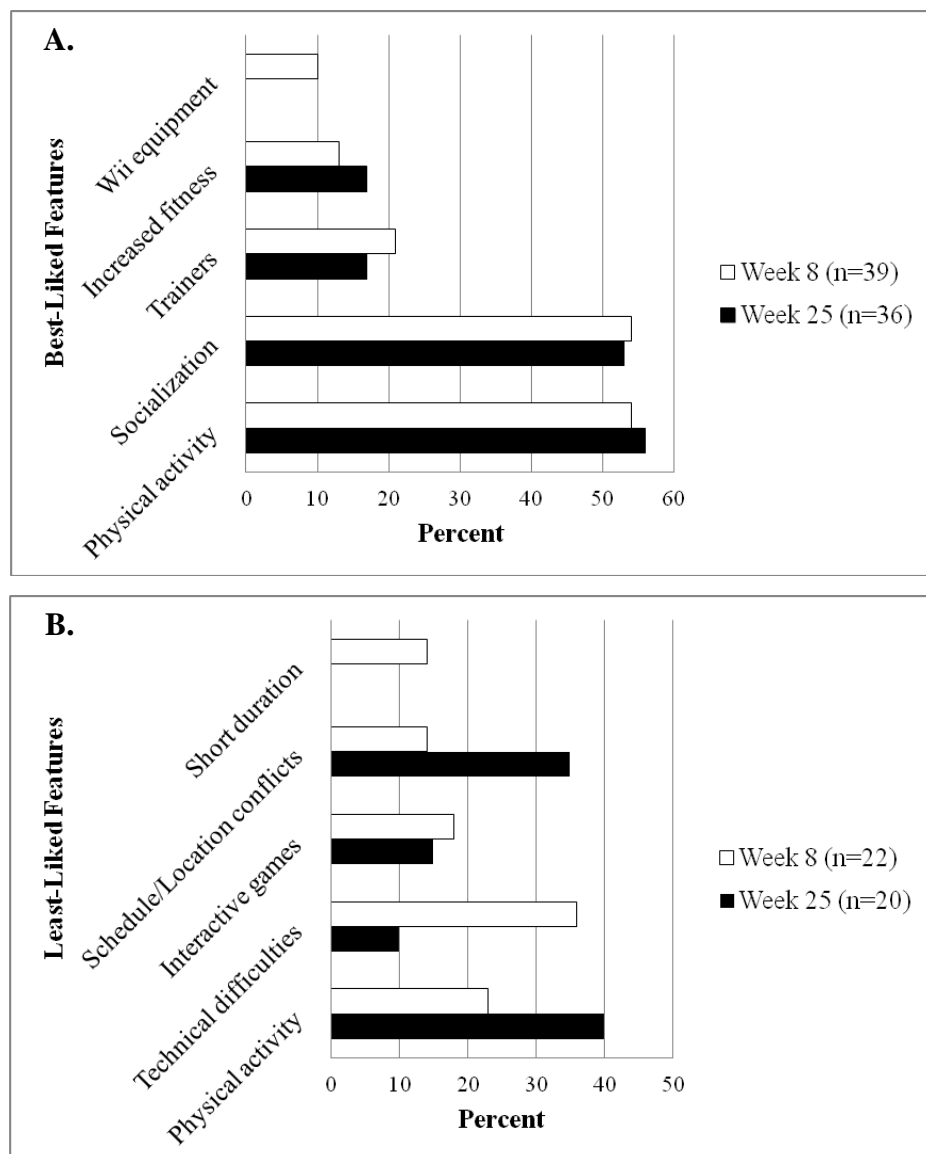


Figure 2. Program attributes (A. Best-liked; B. Least-liked) perceived by the participants at two different time points (Weeks 8 and 25). Participants were able to provide more than one response.

Participants recognized several positive changes in their daily lives because of the LIFE Program with nearly no participants reporting perceived negative changes. The most common perceived positive change at Weeks 8 and 25 was participating in regular physical activity (Figure 3). Improved subjective health was the second most reported perceived positive change. Participants also commonly responded seeing improved changes in their level of pain because of their involvement in the program.

No participants reported having a perceived negative change at Week 8 because of the program. Four perceived negative changes were reported at Week 25 and pertained to the short duration of the on-site program (n=3) and the inability to stay caught up on daily activities (n=1).

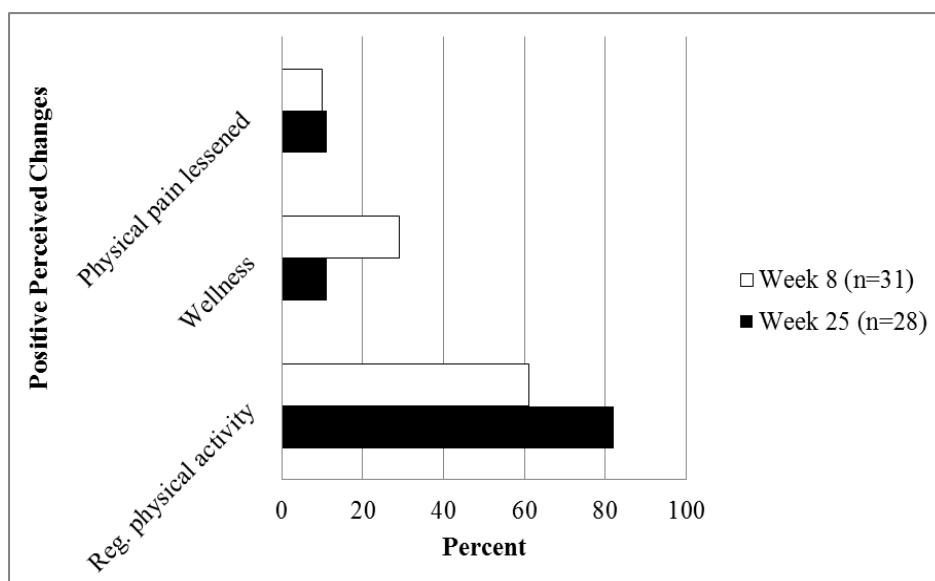


Figure 3. Perceived positive changes made by the participants at two different time points (Weeks 8 and 25). Participants were able to provide more than one response.

Discussion

This pilot community-based exergaming program for older adults suggests improved physical activity participation among physically inactive older adults by increasing their physical activity to at least 120 minutes weekly. Fifty-two percent of the participants identified as inactive at baseline reported being active, based on the criteria used in the questionnaire, by the end of the 25-week program. Maintenance in physical activity was suggested as participants who reported becoming physically active did not regress back to being inactive. This is in agreement with a previous study that found sedentary individuals at baseline who achieved the

ACSM recommended levels of physical activity (at least 30 minutes of moderate-intensity aerobic physical activity on five days each week or at least 20 minutes of vigorous-intensity aerobic activity on three days each week) by the end of the six month intervention program were more likely to continue being physically active six months following the program (Bock, Marcus, Pinto, Forsyth, 2001). The LIFE Program results may be due to the enjoyment, health benefits, and overall wellness the participants felt when they started being physically active, as shown by LIFE Program participants' comments and other research. One LIFE Program participant commented, "*I have learned that exercise is important and it makes you feel better to keep moving.*" Similarly, Bock et al. (2001) noted perceived exercise benefits as a factor for continued physical activity. Additionally, McAuley and colleagues (2003) found self-efficacy and positive social support to be important in the prediction of continued physical activity in older adults.

Taken from the SD storage cards, three of the seven sites continued using the Wii® at their site on their own. One site continued the two sessions per week and met all 32 times during the 16-week newsletter intervention. This site as well as the others that continued meeting had characteristics in common that may have contributed to this sustainability and successful continuation of the program (Figure 4). Of particular interest, these sites had a small, cohesive group of less than 10 participants, personable trainers who were comfortable working with the older adults, and a mixture of young-old and older-old aged participants who all exhibited higher abilities. The location of the site also played a role in the likelihood of program continuation. The most successful site had no other opportunities or facilities available for physical activity in the town and was a site with few distractions. It had adequate space to do the exercises without getting in the way of other activities.

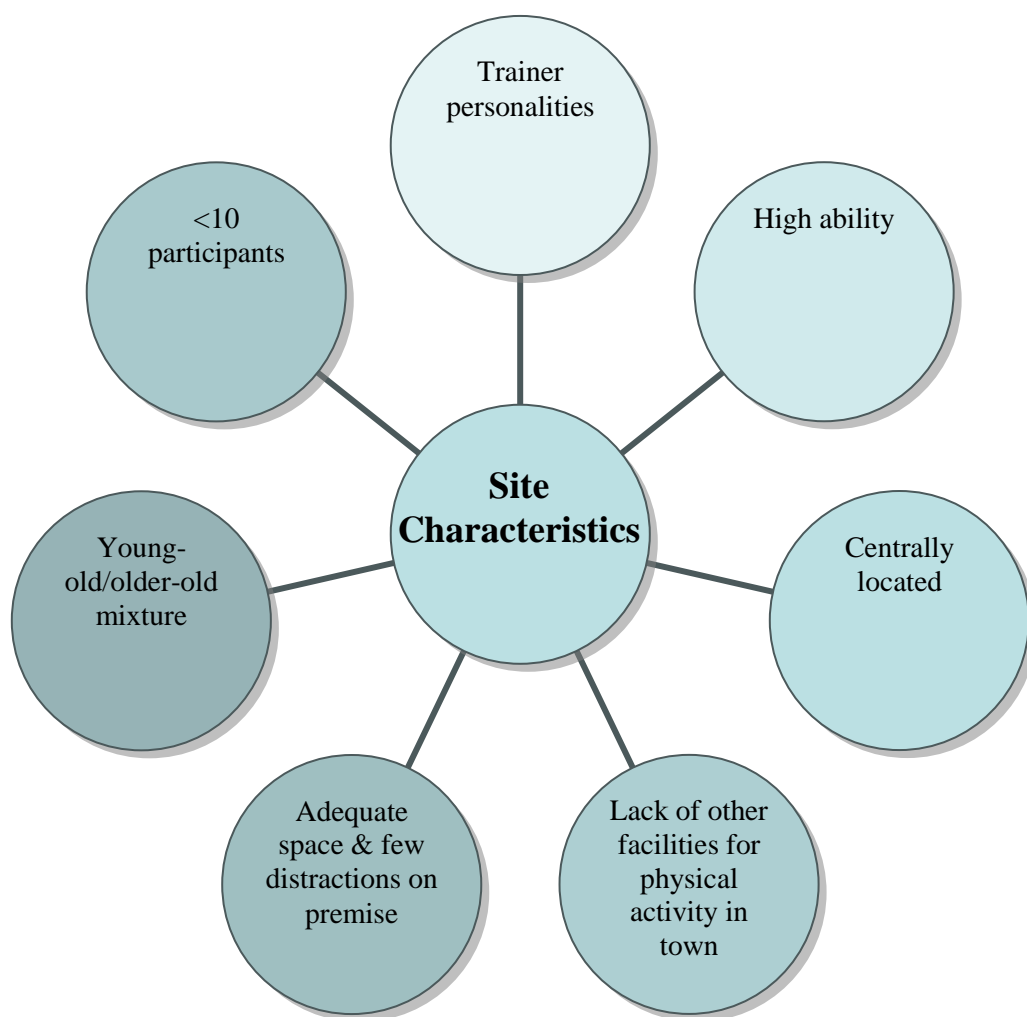


Figure 4. Characteristics of successful sites for sustainability of LIFE Program

Participating in regular physical activity was the most frequently reported perceived positive change. These comments support the self-reported physical activity question embedded in the questionnaire. As regular physical activity has previously been shown to have several benefits for older adults, including improved health, prolonged independence, and delayed progression of disease and death, this suggests that an exergaming program may be an effective means of improving the long-term health and quality of life of older adults (Phillips, Schneider, Mercer, 2004).

The improved physical activity participation and maintenance of this behavior may be due to diminished perceived barriers. The LIFE Program minimized barriers by holding the

program at familiar and easily accessible locations and offering a group design with appropriate exercises for older adults to feel comfortable participating. Older adults' perceived barriers to physical activity have been due to programs not targeted for them nor accommodating to their needs, low self-efficacy, and a lack of knowledge to begin being physically active on their own. Likewise, Shores and colleagues (2009) found that physically active rural-residing older adults were more likely to report that they felt safe in activity environments, had a companion to be active with, lived within walking distance of a park, and had an activity area close to home. Participants appreciated that the LIFE Program was designed specifically for them and that the Wii® EA Active exercises chosen were at a level they could handle as supported by the comments, *"Worked at own pace and ability; great guidance in the activity"* and *"Geared to exercises I can do."* Participants demonstrated their improved self-efficacy and knowledge following the program by commenting on how they learned new exercises to do on their own, such as *"I found different ways to exercise at home and will continue."* Self-efficacy has been shown to be one of the most effective strategies in motivating older adults to be physically active (Dionigi, 2007). The relationship between self-efficacy and physical activity is consistent with McAuley and colleagues' (2006) findings where active older women had greater self-efficacy, which was associated with more positive physical and mental health. The improved health status, in turn, relates to satisfaction with life. Participants showed excitement and enthusiasm regarding the improvements they had made and were proud of the changes they were making in their daily lifestyle. One LIFE Program participant commented, *"I could never [have] kept up with the walking tour [abroad] had I'd not had the exercise from senior center, so thanks!"* Older adult physical activity programming suggests improved self-confidence, allowing older adults to feel capable in remaining physically active on their own by providing them with the knowledge they need.

As evidenced by this study, participants perceived positive changes in their wellness and the degree of pain they experienced due to the exergaming. A couple of participants commented that he or she *"was able to do things that [she] had to reach for with less restriction and pain"* and had *"more energy to do daily activities."* Another commented, *"My shoulder, neck (osteoarthritis) is 100% better, being active has helped tremendously."* This aligns with previous research, which found that older adults who exergame have increased subjective physical health and had positive comments related to how they felt emotionally and physically

after playing (Wollersheim, 2010). The desire for improved health is supported by Burton, Shapiro, and German (1999) who also found that the majority of older adults who initiated physical activity at some point during a four year time period did so because they believed that exercise was important to their health. The LIFE Program results indicate physical activity through exergaming may be an effective strategy for improving strength, increasing energy, and reducing stiffness and soreness. These benefits realized by the LIFE Program participants may be part of the reason for physical activity continuation and maintenance. As individuals begin feeling better and noticing change, they may be more likely to continue. Additionally, the uniqueness of exergaming may play a factor in keeping older adults physically active. A recent study compared exergaming with a traditional exercise program in older adults and concluded that the exergaming group attended 30% more frequently than the traditional group (Warburton, et al., 2009).

Other studies have also shown positive changes in mental health in addition to physical health, such as improvement in depressive symptoms, mental health-related quality of life, and cognitive function (Rosenburg, et al., 2010). Similarly, LIFE Program participants stated they appreciated the opportunity to “*learn different activities to do.*” This suggests that exergaming, when provided in a structured format, is a safe and effective way for healthy older adults to participate in physical activity and improve whole body wellness.

The relatively high completion rate (67.6%) seen with the LIFE Program for a community-based physical activity program may be attributed to the features of the program that the participants liked including the type of physical activity and opportunity for socialization. Participants commented that they enjoyed “*socializing and exercising with others*” and “*exercising a new way.*” Socialization was reported as being the second most-liked feature of the program. Socialization has also been found in a similar study to be a well-liked exergaming feature (Wollersheim, et al., 2007). Older adults value the sense of fulfillment from the social interactions with the other participants as well as the support and encouragement received from the group (Dionigi, 2007; Layne, et al., 2009). Previous studies have shown that the social support given in group programs can counteract the isolation that older adults often experience and that companionship during activities improves physical activity among older adults (Layne, et al., 2008; Shores, et al., 2009).

Interestingly, physical activity was the most commonly reported best-liked feature but was also the one of the most popular least-liked feature among the participants. One participant commented he or she liked that it “*enabled me to get exercise*” while others commented they “*did not like working [his or her] legs*” or “*doing the lunges*”. Participants realized they may have disliked the physical activity during the session, but acknowledged they felt better afterwards as stated by one participant who said, “[*The LIFE Program*] *showed me the necessity of exercise and kept reminding me to continue.*” Fewer individuals reported a least-liked feature than they did a best-liked feature. Because the physical activity was commonly reported as the best-liked feature, it may be reasonable to suggest that participants are likely to continue with the program. It has been shown that those who reported high enjoyment in physical activity were more likely to report higher levels of activity (Salmon, Owen, Crawford, Bauman, Sallis, 2003). Some LIFE Program participants enjoyed the exergaming physical activity so much that they purchased the Wii[®] for in-home use. Although the percentage of participants who reported physical activity as being a best-liked feature of the program remained relatively the same from Week 8 to 25, the percentage who reported the physical activity as being the least-liked feature nearly doubled from Week 8 to 25. This may be because the participants took part in other forms of physical activity that were not as enjoyable as the Wii[®] such as walking, swimming, and strength training which are not typically social activities and may not have resulted in as much enjoyment as what the Wii[®] provided. After 16 weeks of not having the on-site program, they may have forgotten the amount of enjoyment they experienced during the program. In agreement with this, at Week 8, the Wii[®] equipment was one of the best-liked features, although it was not reported as a best-liked feature at Week 25.

Although several participants reported their enjoyment of the Wii[®], technical difficulties was the most reported disliked component of the program at Week 8. Technical difficulties included such things as the poor connection between the Wii[®] remotes and the Wii[®] console as well as the time consuming procedure of setting up all the equipment properly. One individual responded he or she disliked that the “*Wii[®] not responding to some movements. It seemed to get stuck and not recognize that I had done what it suggested*” while another one mentioned that it “*seemed to take a while for the machine to get set up.*”

Limitations

A limitation of this pilot study was the relatively small sample size. Therefore, generalizations cannot be made. However, our findings are similar to and support previous exergaming program studies.

The sample itself was another limiting factor. Because the study used a convenience, snowball sample, participants were already motivated and excited to participate in the program. Those who were not physically active at the start of the program may have been more likely to begin being physically active than if the sample was completely random. Of the 100 participants interested, only 68 chose to start the program, leaving a group of people with similar motivations and personalities. Additionally, participants were not very diverse as 87% were female and all were Caucasian. However, this is representative of the population where the program took place. The United States population consists of more older females (14.1%) than males (11.2%) (United States Census Bureau, 2011a). Additionally, 91% of the total population in Iowa is Caucasian (United States Census Bureau, 2011b).

Further, the 8-week on-site program may not have been long enough to see significant changes. However, this study had an average time length comparable to that of other studies (6 to 12 weeks) (Wollersheim, et al., 2010; Warburton, et al., 2007; Rosenberg, et al., 2010). Since so few studies have been conducted on older adult exergaming programming, the most beneficial length may not yet be known.

Lastly, when no response was reported for the qualitative evaluation questions, it cannot be determined whether this indicated that the participant had no preference or if he or she may not have wanted to provide negative feedback. It could also be a result of participant fatigue as they completed a 10-page questionnaire and fitness test prior to completing the evaluations.

Conclusion

These results indicate that the LIFE Program is a well-received community-based physical activity program. Providing rural-residing older adults an opportunity to participate in group physical activity has the potential of increasing physical activity participation in those who were previously sedentary and improving subjective health and decreasing the incidence of chronic disease and disability. This translates into improved quality of life and possibly a reduction in associated health care costs.

Qualitative comments suggest that the formalized exergaming program utilized is an effective strategy in improving flexibility, strength, socialization, and self-efficacy in rural-residing older adults. The participants' perceptions of improved wellness and their positive reaction to the physical activity increase the likelihood of program continuation.

Identified successful site characteristics such as a small group size, personable trainers, a mixture of ages with higher abilities, and an ideal location, indicate exergaming programs following these similar attributes may be a sustainable means to promoting physical activity in older adults.

Overall, this study suggests exergaming programs are beneficial in helping older adults take part in regular physical activity, consisting of at least 30 minutes of moderate physical activity at least four times weekly. Due to the nature of the exercises and the opportunity for socialization, exergaming breaks down previous perceived barriers of older adults and encourages continued participation in physical activity.

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CHAPTER V: IMPACT OF COMMUNITY-BASED EXERGAMING PROGRAM ON OLDER ADULT FITNESS

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Abstract

Background. Physical inactivity among older adults increases the incidence of chronic disease and disability. Physical activity through exergaming is an innovative way to enhance older adult fitness.

Methods. This crossover design study examined the impact an 25-week exergaming program for rural-residing older adults had on fitness. Three Senior Fit Test components (chair stand, back scratch, and hand grip [using dynamometer]) were completed at Weeks 1, 8, and 25. For eight weeks, the program met twice weekly for a total of 60 minutes of Wii® EA Active. The remaining 16 weeks participants received eight wellness newsletters. Data were analyzed using Statistical Package for Social Sciences for Windows (version 17.0).

Results. Forty-six older adults completed the program (67.6% completion rate). Significant improvement was seen in the chair stand ($p \leq 0.002$ from Week 1 to Weeks 8 and 25), right hand grip ($p = 0.002$ from Week 1 to 25), left hand grip ($p \leq 0.043$ from Week 1 to Weeks 8 and 25), and left back scratch ($p \leq 0.033$ from Week 1 to Weeks 8 and 25) tests.

Conclusions. These results suggest an exergaming program is an effective strategy in improving fitness in healthy, rural-residing older adults.

Introduction

Due to advancements in medical technology and the aging baby boomer generation, the older adult population is growing rapidly. Currently 13% of the United States population is age 65 years and older (United States Census Bureau, 2011a). This is only expected to increase in the coming years to nearly 20% of the population by 2030 (United States Census Bureau, 2011a). However, the amount of physical activity these adults participate in has not followed a

similar trend. Fewer than five percent of older adults meet the Centers for Disease Control (CDC) physical activity recommendations of at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity every week (Rosenberg, et al., 2010; CDC, 2011). It is estimated that one-third of men and half of women age 75 years and older engage in no physical activity (Hughes, et al., 2005).

Physical activity is a key modifiable behavior for improving numerous physical health conditions and functioning in older adults (Rosenberg, et al., 2010). Being physically active prevents several chronic diseases such as cardiovascular disease (CVD), hypertension, and Type 2 diabetes and improves physical fitness, strength, flexibility, and balance. These are all necessary components in maintaining independence, improving health-related quality of life (QOL), and increasing performance in activities of daily living (ADLs) (Dionigi, 2007).

Barriers to physical activity and exercise programs often prevent older adults from participating in regular physical activity, thereby, preventing them from realizing the associated benefits. Barriers include such things as noncompliance to exercise programs not targeted for older adults, location (e.g. rural versus urban), lack of knowledge regarding appropriate exercises, low self-efficacy, and limited income. (Dionigi, 2007; Dorgo, Robinson, & Bader, 2009; Hildebrand & Neufeld, 2009; Hughes, et al., 2005; Rosenberg, et al., 2010; Shores, West, Theriault, & Davison, 2009). Exercise programs targeted specifically for older adults can help reduce the aforementioned perceived barriers and increase the opportunities available for them to be physically active (Layne, et al., 2008).

Exergaming, video gaming with exercise, is a new means of physical activity that is just now being realized as a valid way to meet the physical activity recommendations for all age groups. It is an activity that focuses on the fun of video gaming while also gaining the benefits of physical activity. Use of the Wii® by older adults can help them obtain at least 30 minutes of light intensity activity daily (Graves, et al., 2010). Exergaming can provide health benefits in older adults, including a reduction in their risk for CVD and Type 2 diabetes (Graves, et al., 2010).

While little research has been done on exergaming programs for older adults, exergames are being increasingly used in senior centers and retirement communities because of the socialization and interaction with others it provides. Therefore, this pilot study evaluated a community-based intergenerational exergaming program using the Nintendo Wii® EA Active

game at seven different rural locations for adults age 60 years and older to assess if exergaming improved fitness as measured by components of the Senior Fit Test including chair stand, back scratch, and hand grip.

Methods

Program design

The Living Well through Intergenerational Fitness and Exercise (LIFE) Program was a cross-over designed, pilot study for a theory- and community-based, intergenerational exergaming program for older adults. Two behavior change models guided the LIFE Program: Transtheoretical Model and the Whole Person Wellness Model. The Transtheoretical Model suggests behavior change occurs over time as a process of five stages (precontemplation, contemplation, preparation, action, and maintenance) rather than at one moment. The LIFE Program targeted those in contemplation through preparation. The Whole Person Wellness Model is a behavior change model, encompassing a holistic perspective, on wellness that integrates six wellness dimensions (physical, emotional, spiritual, intellectual, occupational, and social). The LIFE Program targeted four of the wellness dimensions: physical (Wii® EA Active/newsletters), emotional (group setting/intergenerational), intellectual (interactive games), and social (group setting/intergenerational).

The two main parts of the 25-week LIFE Program included: the on-site program (8 weeks) and a wellness newsletter intervention (16 weeks). The first eight weeks included the on-site program where younger adult trainers (hence forth referred to as trainers) led the Wii® program to the older adults (hence forth referred to as participants). Trainers (n=18) received training prior to the start of the LIFE Program which discussed equipment use, safety precautions, and study protocol. The on-site program met twice weekly with one day separating the sessions. Seven rural sites hosted the on-site program (five congregate meal sites, two senior centers). Within each site, three to 18 participants took part in the program with two to three trainers leading them. Participants signed an attendance sheet daily to record participation. Each site was equipped with a Wii® Kit, which stored all the contents needed for the program, including the Wii® console, projector (to allow for larger picture), speakers, Wii® EA Active game, and necessary accessories.

The LIFE Program used the Nintendo Wii® EA Active video game. The Wii® detected motion through remotes and nunchuks participants held. Wii® EA Active allowed two players to follow a virtual personal trainer on the screen who provided direction, encouragement, and support throughout the session; the others participated in the same exercises while standing behind those with the Wii® remotes. All participants were provided with resistance bands for the needed exercises. The virtual personal trainer demonstrated each exercise before the participants began doing the exercise themselves. Exercise movements were repeated throughout the weeks to enhance familiarity. As the participants became more comfortable with the exercises, the informative videos were skipped in order to fit the entire designed workouts into the allotted thirty minutes. The trainers supervised and helped the participants do the exercises correctly and safely.

Both days included 30 minutes of physical activity using the Wii®. Twelve (two per week) different age appropriate workouts were created by an exercise physiologist. Because of data collection during the first and last week, Weeks 1 and 2 and Weeks 7 and 8 contained the same workouts. All exercises were selected individually to ensure appropriateness and safety for older adults and were deemed appropriate as chair exercises for those unable to stand for the entirety of the program. The activities gradually increased in duration and difficulty during the on-site program, with Session 1 lasting 13 minutes and Session 16 for 23 minutes. Exercises included aerobic activity, such as walking and running in place, dancing, boxing, and the fundamentals of a variety of sports as well as upper and lower body strength training using resistant bands.

As part of the intergenerational component of the LIFE Program, participants and trainers played interactive games together on Day 2 for an additional 30 minutes. These games consisted of introductory games similar to icebreakers, storytelling activities, and strategy and mind games. Gathered from a variety of resources, these games were intended for a group setting and designed to promote team building, problem solving, and communication skills within the group.

These eight weeks encompassed the data collection days, which included Weeks 1 and 8 of the designated on-site period, providing six complete weeks of physical activity. For participating in the study, participants received a cookbook (Week 2), *Exercise and Physical Activity* book (Week 3) (National Institute on Aging, 2010) and “Exercise: A Video from the National Institute on Aging” DVD (Week 8) (National Institute on Aging, 2010).

Participants interested in being an on-site leader (n=6) to continue the program after the on-site program ended were instructed by trainers through integrated training sessions during the eight weeks. This was intended to promote program sustainability. Trainers educated the on-site leaders on the basic assembling and disassembling of the Wii® and safety precautions. To be an on-site leader, the participant was required to sign a consent form and complete an additional qualitative evaluation at the end of the study (25 weeks) about their experience. All study protocols were approved by the Iowa State University Institutional Review Board. The study was sponsored by The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

Newsletter intervention. Following the on-site program, participants received eight wellness newsletters (4 fitness/nutrition, 4 cognitive/social) biweekly for 16 weeks, designed to promote whole person wellness. The fitness/nutrition newsletters offered ways to create a healthy plate, similar to the MyPlate icon, which was released after the start of the LIFE Program, and at-home exercising and stretching suggestions. The cognitive/social newsletter included mind games and ways to remain cognizant. During this 16-week time period, participants were encouraged to continue using the Wii® on-site. Wii® usage at the sites was recorded and stored using Scan Disk (SD) storage cards; data not presented here.

Recruitment

Site recruitment. The LIFE Program was designed for delivery in rural towns where congregate meals are held at least twice weekly. Five congregate meal sites and two senior apartments within central Iowa participated. Each site received the Wii® Kit as well as the Wii® Resort and Wii® SportsResort games at the end of the study.

Participant recruitment. Rural-residing older adults were recruited through convenience and snowball sampling using direct and indirect methods. To participate, older adults had to be 1) age 60 years and older and eligible to participate in congregate meal sites, 2) literate, 3) able to participate as determined by the physical activity readiness questionnaire (American College of Sports Medicine, 2007) and/or physician permission, and 4) able to complete questionnaires at multiple time points (Week 1, 8, and 25). All participants signed a consent form.

Data collection

Data collection was completed at three different time points throughout the program, including Week 1 (before program began), Week 8 (completion of the on-site program), and Week 25 (completion of the newsletter intervention) by trained personnel. During Weeks 8 and 25, participants also completed a qualitative evaluation regarding their experience in the LIFE Program (data not presented).

The questionnaire consisted of sociodemographic background questions and reliable, valid assessments to assess self-reported physical activity participation. Sociodemographic background questions pertained to age, sex, ethnicity, marital status, self-reported health status, living arrangements, and frequency of interaction with younger adults.

Functional limitations were assessed using the Late Life Function Instrument (LLF) and Late Life Disability Instrument (LLD), each containing 32 questions (Jette, et al., 2002). LLF questions related to the ability and ease in which various activities could be performed while the LLD evaluated self-reported frequency and limitations of performing life tasks. Using the validated scoring guide, participants' raw scores were transformed to a scaled score (0-100) in order to have all the domain scores and overall score on a similar metric. The transformed scores are based on a one-parameter Rasch model, which transforms the raw scores into a linear scale. If an answer was left blank by the participant, an estimated score was determined by averaging the participant's scores from the domain of the missing question.

Functional fitness was assessed using components of the Senior Fit Test, including the chair stand test, the back scratch test, and the hand grip test using a handgrip dynamometer (Rikli & Jones, 2001). The chair stand test was used to assess lower body muscular endurance. The participant was timed for 30 seconds while standing up and sitting back down in an armless chair as many times as possible. The back scratch test assessed flexibility. For this test, the participant was instructed to try to touch his/her index fingers together behind the back by reaching over the shoulder and under the elbow. While the participant was stretching, the trainer used a standard, 12-inch ruler to measure the gap between the right and left middle fingers. The hand grip test assessed the muscular strength. The handgrip dynamometers used at all sites were Jamar Hand Dynamometers (Bolingbrook, IL).

Age group percentile norms were determined and used to score the chair stand and back scratch test in order to make an accurate and fair comparison between the participants who

ranged in age groups and gender (Rikli & Jones, 2001). Hand grip strength was scored using the number of pounds recorded from the dynamometer during testing.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences for Windows (SPSS for Windows, version 17.0, 2007). Significance was determined at $p \leq 0.05$. Demographic information was analyzed with descriptive statistics. One-way analysis of variance was used to measure differences between age, self-reported health status, and attendance at Week 1. ANCOVA was used to control for health status in measures where significant differences at Week 1 were found. For all other measures of the Senior Fit Test, repeated measures ANOVA was used to assess changes over time. Only participants who completed a questionnaire at each time point are included.

Results

Demographics

Of the 100 interested older adults, 68 started the program; 46 completed (67.6% completion rate). The majority of participants were female (87%), Caucasian (100%), and widowed (52%) with an average age of 75.3 years (Table 1). Reasons for attrition included: 1. health (n=9), 2. limited time (n=3), 3. participation other exercise classes (n=2), 4. moved away (n=1), or 5. unknown (n=6).

Table 1. Participant sociodemographic baseline data

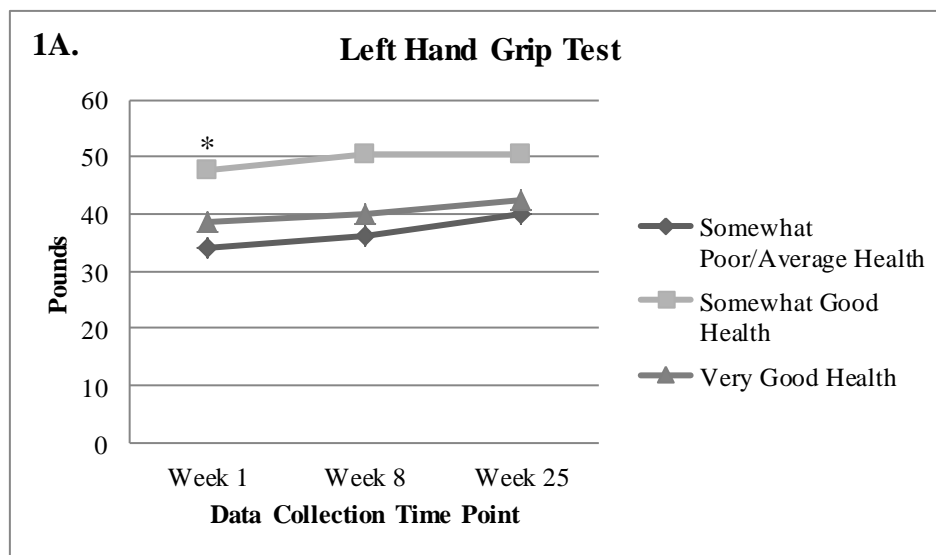
	Number ^a	Percent
Age^b (years)	75.3	60-92
Gender		
Male	6	13.0
Female	40	87.0
Ethnicity		
Caucasian	46	100
General health		
Very poor	0	0
Somewhat poor	4	8.7
Average	14	30.4
Somewhat good	17	37.0
Very good	11	23.9
Marital status		
Single, never married	3	5.8
Married	17	32.7
Divorced	5	9.6
Widowed	27	51.9
Living arrangement		
Apartment or home	37	80.4
Independent &/or Assisted Living Facility	5	10.9
With Adult Children	1	2.2
Other	3	6.5
Contact with youth in a day		
Never	14	26.9
Occasionally	32	61.5
Several times a day	6	11.5

^a Total number of participants=46; ^b Data provided are mean and range.

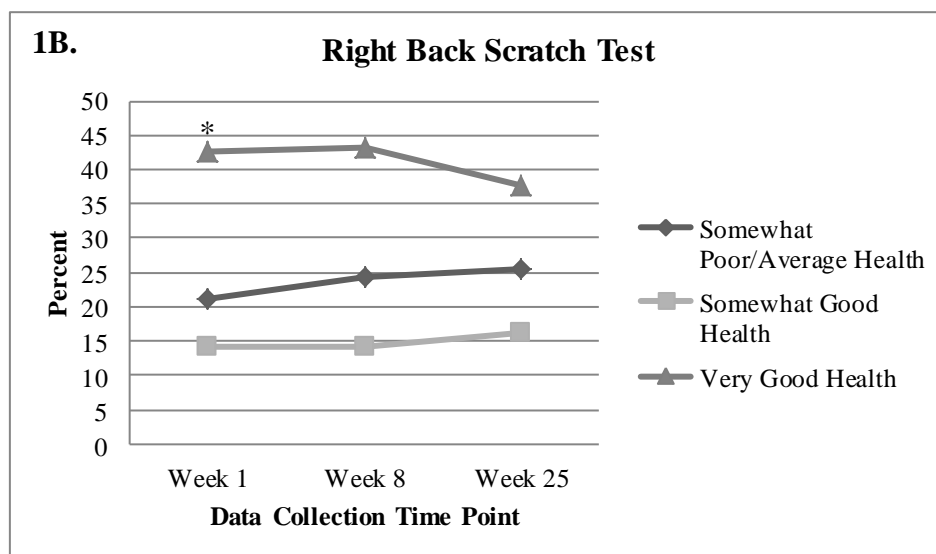
Functional fitness

Differences at baseline (Week 1) between the self-reported health groups (somewhat poor & average [n=18], somewhat good [n=17], and very good [n=11]) were measured. Significant differences between health groups at Week 1 were noted for left hand grip strength (p=0.050) and right back scratch test (p=0.010). Participants who perceived themselves in somewhat good

health had significantly greater grip strength in the left hand at baseline than those who perceived themselves as in poor or average health ($p=0.041$) (Figure 1a). Significant differences were also noted between those in very good health and somewhat good health for right arm flexibility ($p=0.007$) (Figure 1b). Due to the significant differences at baseline, these tests were then analyzed controlling for health using ANCOVA. No significant differences at Week 1 between attendance, age groups, trainer influences, or seasonality for any Senior Fit Test measure were identified.



*Difference between Somewhat Good and Somewhat Poor/Average Health is significant (p=0.041).

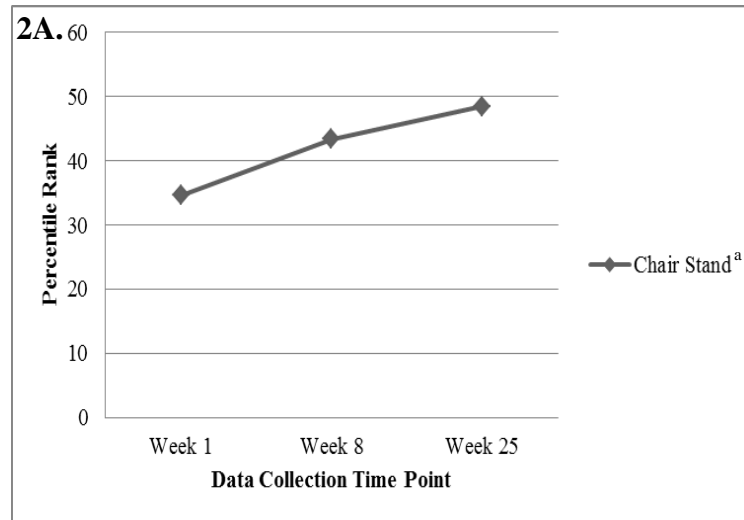


*Difference between Very Good and Somewhat Good Health is significant (p=0.007).

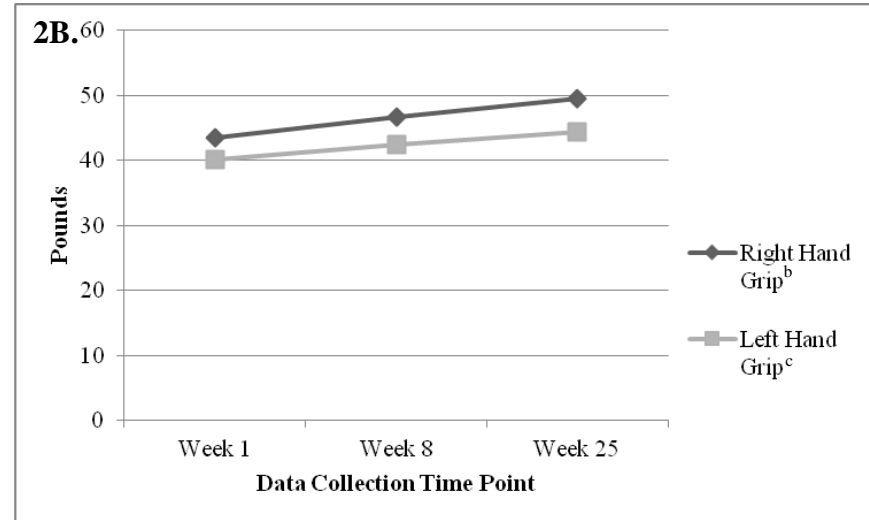
Figures 1a-1b. Mean differences between health groups at Weeks 1, 8, and 25 for tests left hand grip (Figure 1A) and right back scratch (Figure 1B).

ANOVA and ANCOVA showed significant improvement in the number of chair stands (measured as age group percentile norm) from Week 1 (M=34.67) to Weeks 8 (M=43.37, $p=0.002$) and 25 (M=48.48, $p<0.001$), right hand grip strength (measured in pounds) from Week 1 (M=43.52) to 25 (M=49.62, $p=0.002$), left hand grip strength from Week 1 (M=40.1) to Weeks 8 (M=42.41, $p=0.043$) and 25 (M=44.47, $p=0.017$), and left side flexibility (measured as age group percentile norm) from Week 1 (M=13.91) to Weeks 8 (M=17.5, $p=0.033$) and 25 (M=18.91, $p<0.001$) (Figures 2a-c). Age and attendance did not influence the changes noted in functional fitness. ANCOVA analyzes, controlling for self-reported health status, did not indicate significant improvement for right side flexibility.

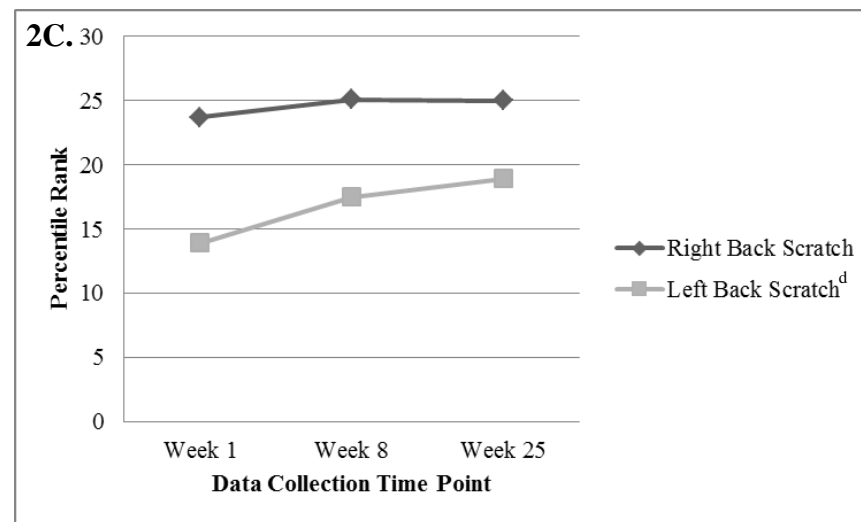
Significant improvement ($p\leq 0.05$) for chair stand, left grip strength, and left arm flexibility was found from Week 1 to Weeks 8 and 25. Maintenance was indicated from Weeks 8 to 25 due to no significant changes (Table 1). Right grip strength showed significant improvement ($p=0.002$) over the course of the 25-week program. No improvement was detected in right arm flexibility. LLF and LLD assessments showed no significant changes in functional limitations. Data are not presented here.



^a $p \leq 0.002$; $n=46$



^b $p=0.002$; ^c $p \leq 0.043$ (Values for left hand grip are for when controlled for health); $n=46$



^d $p \leq 0.033$ (Values for right back scratch are for when controlled for health); $n=46$

Figures 2a-2c. Participants' mean values for Senior Fit Test (A) chair stand, (B) hand grip, (C) back scratch at Weeks 1, 8, and 25.

Table 1. Participants' significant mean values for Senior Fit Test measures at Weeks 1, 8, and 25^a.

Measure	Mean	± Std Error	p value
Chair stand^b			
Week 1	34.67	3.73	p=0.002* (Wks 1-8)
Week 8	43.37	4.24	p=0.081 (Wks 8-25)
Week 25	48.48	4.14	p<0.001* (Wks 1-25)
Right hand grip^c			
Week 1	43.52	2.64	p=0.054 (Wks 1-8)
Week 8	46.66	2.59	p=0.107 (Wks 8-25)
Week 25	49.62	2.32	p=0.002* (Wks 1-25)
Left hand grip^{c,d}			
Week 1	40.1	2.50	p=0.043* (Wks 1-8)
Week 8	42.41	2.44	p=0.221 (Wks 8-25)
Week 25	44.47	2.37	p=0.017* (Wks 1-25)
Left back scratch^b			
Week 1	13.91	2.99	p=0.033* (Wks 1-8)
Week 8	17.5	3.21	p=0.113 (Wks 8-25)
Week 25	18.91	3.12	p<0.001* (Wks 1-25)

^an=46, ^bMean values in age group percentile norm, ^cMean values in lbs, ^dControlled for health

*p<0.05 considered significant

Discussion

This pilot community-based exergaming program for older adults suggests improved arm flexibility, leg strength, and hand grip strength among participants. These findings are similar to Stutz, Denning, Cary, and Phillipson (2011) and Warburton and others (2007) that showed improved functional fitness, balance, and muscular power in older adults taking part in exergaming exercise programs. These found improvements have clinical significance in that fitness improvements may improve older adults' ability to perform ADLs. Adequate leg strength helps adults climb stairs, walk, and get out of chairs, while flexibility helps making combing hair and reaching into cabinets easier and increased grip strength lends to improved ability in opening medicine bottles.

This noticeably improved strength and flexibility with the LIFE Program may be part of the reason for physical activity continuation and maintenance until Week 25; the benefits realized may have acted as motivation for the participants. This is similar to the findings of Dionigi (2007) who found that after older adults participated in 12 weeks of physical activity,

they felt their improved fitness had a positive effect on their ability to carry out “normal things” associated with daily living. Similarly, Rydwick (2004) found that nursing home residents who participated in strength training for eight weeks reported having participated in more overall ADLs than those who did not.

The relatively low attrition rate (32.4%) and the maintenance of physical activity may have been due to the uniqueness of exergaming. Because the focus of exergaming is on the game rather than the exercise itself, this type of activity helps increase program adherence (Papstergiou, 2009). A recent study compared exergaming with a traditional exercise program in older adults and concluded that the exergaming group attended 30% more frequently than the traditional group (Warburton, et al., 2009). Traditional exercise programs have an average attrition rate of 50% within three to six months of older adults starting an exercise program. Rosenberg et al. (2010) noticed a much lower attrition rate (14%) in their 12-week program using Nintendo Wii®; however, this low attrition rate may be attributable to their small sample size (n=22). Three of the LIFE Program sites had an attrition rate of 25% or lower as well. The opportunity for socialization and the age-appropriate exercises may be other reasons for the low attrition rate of the LIFE Program. Previous research by Dionigi (2007) and Layne, et al. (2008) have shown that older adults who participate in age-appropriate exercise programs have not only valued the activity for the physical benefits, but have also reported fulfillment from the social interactions with other participants as well as the support and encouragement received from the group. Social support has a significant role in improving physical activity participation among older adults (Shores, et al., 2009). Exergaming programs may be an ideal way to motivate older adults as it is fun and an opportunity for them to socialize and interact with their peers.

No matter the reason for continued physical activity, the immediate and long-term benefits are numerous. Research suggests regular physical activity is an effective preventative strategy against numerous chronic diseases affecting older adults, including CVD, obesity, stroke, hypertension, Type 2 diabetes, and psychological disorders (Warburton, et al., 2007). Regular physical activity has also previously been shown to have several benefits for older adults long-term, including improved health, prolonged independence, and delayed progression of disease and death (Phillips, Schneider, Mercer,

2004). Taken together, this suggests that an intergenerational exergaming program may be an effective means of improving the long-term health and quality of life of older adults.

Continued physical activity is needed to maintain the improvements older adults gained during the LIFE program. While the participants did not show significant improvements in their Senior Fit Test from Week 8 to Week 25, which were the weeks following the on-site program, the older adults succeeded in maintaining their improvements made from the on-site program (Weeks 1 to 8). Maintaining fitness improvements after an exergaming exercise program is of significance as functional decline is associated with increased mortality; previous research supports that interventions designed to prevent functional decline have the potential to reduce the physical, emotional, social, and financial problems attributable to disability (Gill, et al., 2002). Additionally, Galloway and Jokl (2000) agree that many age-related declines in musculoskeletal function can be reduced by participating in some type of regular physical activity. Hence, prevention of functional decline during Weeks 8 to 25 is of equal importance to the improvements made in functional fitness during the on-site program.

The LIFE Program participants showed the largest improvements in their leg strength; as a mean, the participants increased their norm score by 13.8% from baseline to the completion of the study. By Week 25, the mean participants were at 50% of their age group norm. This gain is crucial for older adults as previous research has shown that leg strength is important for walking endurance and physical functioning (Ades, Bailor, Ashikaga, Utton, Nair, 1996). In support of this, Guralnik and colleagues (1995) showed that older adults who scored low on performance tests related to lower extremity performance tests at baseline were almost five times as likely to have a disability four years following compared to those who scored high.

Grip strength and arm flexibility, two other areas of improvement noted by the participants, are also of great importance in functional fitness in older adults. Recent research has indicated that grip strength is a long-term predictor of mortality, cardiovascular disease, and cancer in men (Gale, Martyn, Cooper, Sayer, 2007). Grip strength measurements provide insight on the functional integrity and muscle strength of the upper extremity in individuals (Arinci Incel, Ceceli, Bakici Durukan, Rana Erdem, Rezan

Yorgancioglu, 2002). Likewise, upper body flexibility, along with lower and upper body strength and balance, plays a crucial part in maintaining independent functioning and physical mobility in older adults (Pepin, Phillips, Swan, 2004).

When comparing the left and right side in the back scratch test, it was noted that no improvement in the right side was seen; however, significantly large improvements were made in the flexibility of the left arm (Figure 2). Although the participants did not report their dominant hand, over 70% of humans are right-hand dominate (Holder, 1997). Therefore, it is reasonable to suggest that there was a ceiling effect for the flexibility of the right arm as this side scored comparatively high to the left side (Figure 2). Even after significant improvements, the mean flexibility in the left arm remained lower than the right arm.

Although both hands had similar strength capabilities at baseline, the right hand grip had slightly higher mean values than that of the left hand for all data collection time points (Figure 2). This is in agreement with Arinci Incel and colleagues (2002) who reported that right-hand dominant participants had a significantly higher strength score in their dominant hand grip (8.20%) compared to their nondominant hand grip. The strength in the right hand grip, however, showed greater significant improvement from Week 1 to 25 than did the left hand. This may be due to the fact that the right hand is used more frequently than the left hand, so improvements made in the program are reinforced through continuous use in daily activities. Also, as the right hand was beginning to get noticeably stronger, participants may have had more self-confidence in using their right hands to open jars or grip onto an item, making additional improvements in their right hand grip strength.

Contrary to what may have been predicted, those who perceived themselves as being in very good health had a weaker left-handed grip strength at baseline than those who perceived themselves in somewhat good health. Additionally, those who perceived themselves in somewhat poor or average health performed better than those in somewhat good health for their right back scratch test. However, since these were perceived health statuses, this may indicate that individuals do not consider their strength or flexibility when determining their health. Older adults may actually be stronger or weaker than they realize.

Limitations

A limitation of this pilot study was the relatively small sample size. Generalizations can, therefore, not be made. However, the findings of the LIFE Program are similar to and support previous exergaming program studies.

Since the study used a convenience, snowball sample, participants were already motivated and excited to participate in the program, making the study sample a limiting factor. Those who were not physically active when the LIFE Program began may have been more apt to begin being physically active than if the sample was completely random. Of the 100 participants interested, only 68 chose to attend the first day of the program. This left a group of people with similar motivations and personalities. Additionally, there was low participant diversity with 87% of participants being female and 100% being Caucasian. However, this represents the population where the program took place. The United States population consists of more older females (14.1%) than males (11.2%) (United States Census Bureau, 2011a). Additionally, 91% and 89% of the total population in Iowa and central Iowa, respectively, is Caucasian (United States Census Bureau, 2011b).

Further, the 8-week on-site program may not have been an adequate length of time to see significant changes. However, the length of the LIFE Program is similar to that of other studies (6 to 12 weeks) (Wollersheim, et al., 2010; Warburton, et al., 2007; Rosenberg, et al., 2010). The most beneficial length may not yet be known, since so few studies have been done on older adult exergaming programming. Most of the participants exhibited high mobile ability at baseline. This may have prevented significant improvements from being made in the LLF and LLD assessments and more improvement seen in the Senior Fit Test due to a ceiling effect.

Although significant changes were identified using the selected tests from the Senior Fit Test, other tests may have been selected to measure areas of fitness improvements made by the individuals that were not assessed in this study. Several participants commented they saw improvements in their endurance, arm strength, and balance; however, these areas of functional fitness were not measured quantitatively.

Lastly, the measurement tools used for the flexibility test in the Senior Fit Test may have prevented detection of small change as their accuracy may have been suboptimal. The

12-inch ruler was adequate to measure distances between hands ≤ 12 inches; however, gaps wider than 12 inches were problematic given the measuring device used.

Conclusion

Based on these results, the LIFE Program may be an effective strategy in improving lower and upper body strength and upper body flexibility in older adults. The uniqueness of exergaming as a means for physical activity may be a reason for the maintenance of functional fitness seen through the end of the program. This is encouraging as continued physical activity has several health benefits for individuals. Based on the knowledge that upper and lower body flexibility, strength, and balance play a vital role in physical mobility and independent functioning, an exergaming program for older adults may be an ideal way for older adults to increase their strength and flexibility and maintain their health through regular and continued physical activity in an enjoyable way. Providing rural-residing older adults an opportunity to participate in inexpensive group exercise has the potential of increasing regular physical activity participation and improving overall functional fitness. This may help decrease the incidence of chronic disease and disability, translating to improved health-related QOL, increased performance in ADLs, maintained independence, and decreased associated health care costs.

Acknowledgements

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CONCLUSIONS

This research project was a pilot study conducted in order to identify changes in functional fitness, physical activity participation, and subjective health made by rural-residing older adults after participating in a 25-week community-based exergaming program using the Nintendo Wii® EA Active. The 8-week on-site program was followed by 16 weeks of newsletter intervention followed and data were collected at Weeks 1, 8, and 25. Qualitative comments were gathered from participant evaluations regarding the LIFE Program.

Results indicate that the LIFE Program and similar exergaming programs may be effective in improving lower and upper body strength and upper body flexibility in older adults. Improvements in the chair stand, left back scratch, and right hand grip test were all identified after program completion. Maintenance of these improvements was seen at Week 25. Because upper and lower body flexibility, strength, and balance play a valuable role in physical mobility and independent functioning, an exergaming program for older adults may be an ideal way for older adults to increase their strength and flexibility and maintain their health through regular and continued physical activity in an enjoyable way.

The LIFE Program helped increase physical activity in older adults who reported being inactive at the start of the program. This study suggests exergaming programs are beneficial in helping older adults participate in regular physical activity, consisting of a minimum of 30 minutes of moderate physical activity at least four times a week. Due to the nature of the exercises and the opportunity for socialization, exergaming breaks down previous perceived barriers of older adults and encourages continued participation in physical activity.

The LIFE Program appeared to be a well-received community-based physical activity program by the older adult participants. Qualitative comments suggest the programming utilized is an effective strategy to increase self-efficacy, lessen perceived pain, improve subjective health, and increase physical activity participation. The socialization, increased fitness, physical activity, and trainers were the most reported best-liked features of the program by the participants. The participants' perceptions of improved wellness and their positive reaction to the physical activity increase the likelihood of program continuation.

Providing rural-residing older adults an opportunity to participate in group physical activity has the potential of increasing regular physical activity participation and improving overall functional fitness. This may help decrease the incidence of chronic disease and disability. This translates to improved health-related quality of life, increased performance in activities of daily living, maintained independence, and possibly decreased associated health care costs.

APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 9/8/2011

To: Dr. Sarah L Francis
1104 HNSB

CC: Dr. Jennifer Margrett
4380 Palmer

From: Office for Responsible Research

Title: Promoting Older Adult Wellness through an Intergenerational Physical Activity Program

IRB Num: 10-429

Approval Date: 9/6/2011

Continuing Review Date: 9/27/2012

Submission Type: Continuing Review /
Modification

Review Type: Full
Committee

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University. Please refer to the IRB ID number shown above in all correspondence regarding this study.

Your study has been approved according to the dates shown above. To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting the "Continuing Review and/or Modification" form.
- **Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems** involving risks to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Research investigators are expected to comply with the principles of the Belmont Report, and state and federal regulations regarding the involvement of humans in research. These documents are located on the Office for Responsible Research website <http://www.compliance.iastate.edu/irb/forms/> or available by calling (515) 294-4566.

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

APPENDIX B: LIFE PROGRAM WII® EXERCISES

WEEKS 1-2 (WEEK 1, if no data collection necessary)

DAY 1 (~13 minutes)	DAY 2 (~14:00 minutes)
<ol style="list-style-type: none"> 1. Biceps Curls with Shoulder Presses 2. Alternating Triceps Kickbacks 3. Bicep Curl with Upright Rows 4. Bent Over Rows 5. Front Shoulder Raises 6. Alternating Bicep Curls 7. Alternating Shoulder Presses 8. Bent Over Rows with Triceps Kickbacks 9. Upright Rows 10. Lateral Shoulder Raises 	<ol style="list-style-type: none"> 1. Walk and Run (medium) 2. Standing Twists 3. Alternating Shoulder Presses 4. Bent Over Rows 5. Alternating Biceps Curls 6. Alternating Triceps Kickbacks 7. Targets and Heavy Bag 3 8. Upright Rows 9. Bent Over Rows 10. Alternating Biceps Curls 11. Alternating Triceps Kickbacks 12. Back, Front and Mid Court (Tennis) 13. Walk and run (short) 14. Dance Basic 1

WEEK 3 (WEEK 2, if no data collection necessary)

DAY 1 (~15 minutes)	DAY 2 (~16 minutes)
<ol style="list-style-type: none"> 1. Walk and Run (long) 2. Bent Over Rows 3. Bicep curl with Upright Rows 4. Alternating side lunges 5. Dance Basic 1 6. Passing 1 (Basketball) 7. Bent Over Rows 8. Bicep Curl with Upright Rows 9. Alternating Side Lunges 10. Side to Side Jumps 11. Dance Basic 1 	<ol style="list-style-type: none"> 1. Walk and Run (long) 2. Squats 3. Run (medium) 4. Targets 1 5. Alternating Bicep Curls 6. Bent Over Rows 7. Dance Basic 2 8. Front Court (Tennis) 9. Squats 10. Alternating Bicep Curls 11. Targets 3 12. Alternating Shoulder Presses 13. Run and Walk (long)

WEEK 4 (WEEK 3, if no data collection necessary)

DAY 1 (~16 minutes)	DAY 2 (~16:00 minutes)
<ol style="list-style-type: none"> 1. Alternating Standing Knee Crunches 2. Dance Basic 2 3. Alternating Cross Knee Punches 4. Targets and Heavy Bag 1 5. Bicep Curls with Shoulder Presses 6. Lateral Shoulder Raises 7. Alternating High Knee Reverse Lunges 8. Inline Skating 9. Alternating Side Lunges with Toe Touches 10. Bicep Curls with Shoulder Presses 11. Alternating Triceps Kickbacks 12. Lateral Shoulder Raises 13. Targets and Heavy Bag 5 14. Run and walk (short) 	<ol style="list-style-type: none"> 1. Walk and Run (medium) 2. Squats 3. Alternating Shoulder Presses 4. Bent Over Rows 5. Alternating Biceps Curls 6. Dance Basic 1 7. Batting (Baseball) 8. Targets 2 9. Alternating Shoulder Presses 10. Bent Over Rows 11. Run, Knees and Kick Ups 2 12. Tennis Random (short) 13. Walk and Run (short)

WEEK 5 (WEEK 4, if no data collection necessary)

DAY 1 (~18 minutes)	DAY 2 (~18 minutes)
<ol style="list-style-type: none"> 1. Walk and Run (long) 2. Squats 3. Run (medium) 4. Targets 1 5. Alternating Bicep Curls 6. Bent Over Rows 7. Catching and Pitching (Baseball) 8. Tennis Random (short) 9. Squats 10. Alternating Bicep Curls 11. Targets 3 12. Bent Over Rows 13. Passing 1 (Basketball) 14. Inline Skating 15. Front Shoulder Raises 16. Run and Walk (long) 	<ol style="list-style-type: none"> 1. Shooting and Passing 1 (Basketball) 2. Pitch and Catch and Bat (Baseball) 3. Run (medium) 4. Squats 5. Alternating Shoulder Presses 6. Alternating Bicep Curls 7. Back Court (Tennis) 8. Targets and Heavy Bag 3 9. Back Court and Front Court (Tennis) 10. Upright Rows 11. Kick Ups (short) 12. Alternating Lunges 13. Alternating Cross Knee Punches 14. Alternating Shoulder Presses 15. Alternating Bicep Curls 16. Run and Walk (medium)

WEEK 6 (WEEK 5, if no data collection necessary)

DAY 1 (~17 minutes)	DAY 2 (~19 minutes)
<ol style="list-style-type: none"> 1. Walk and Run (medium) 2. Squats 3. Bent Over Rows 4. Dancing Random (basic) 5. Upright Rows 6. Alternating High Knee Reverse Lunges 7. Kick Ups (short) 8. Squats 9. Bent Over Rows 10. Dancing Random (basic) 11. Run, Knees and Kick Ups 1 12. Targets and Heavy Bag 1 13. Upright Rows 14. Lateral Shoulder Raises 15. Alternating Bicep Curls 	<ol style="list-style-type: none"> 1. Squats 2. Basketball Random (medium) 3. Back Court and Mid Court (Tennis) 4. Targets and Heavy Bag 2 5. Bent Over Rows 6. Alternating Shoulder Presses 7. Alternating Triceps Kickbacks 8. Squats 9. Shooting and Passing 2 (Basketball) 10. Bent Over Rows with Triceps Kickbacks 11. Bicep Curls with Shoulder Presses 12. Upright Rows 13. Walk and Run (medium) 14. Dance Intermediate 1 15. Alternating Bicep Curls 16. Lateral Shoulder Raises

WEEKS 7-8 (WEEK 6, if no data collection necessary)

DAY 1 (~20 minutes)	DAY 2 (~23 minutes)
<ol style="list-style-type: none"> 1. Walk and Run (short) 2. Standing Twist 3. Run (long) 4. Batting (Baseball) 5. Alternating Shoulder Presses 6. Alternating Bicep Curls 7. Back Court (Tennis) 8. Shooting (Basketball) 9. Standing Twist 10. Front Court (Tennis) 11. Track Random (easy) 12. Alternating Shoulder Presses 13. Alternating Bicep Curls 14. Lateral Shoulder Raises 15. Run and Walk (medium) 16. Bent Over Rows 17. Front Shoulder Raises 18. Pitch and Catch and Bat (Baseball) 19. Dance Basic 1 	<ol style="list-style-type: none"> 1. Dance Intermediate 1 2. Squats 3. Shooting and Passing 3 (Basketball) 4. Targets and Heavy Bag 4 5. Bent Over Rows 6. Alternating Shoulder Presses 7. Back Court and Mid Court (Tennis) 8. Squats 9. Basketball Random (short) 10. Lateral Shoulder Raises 11. Run (long) 12. Bent Over Rows 13. Alternating Shoulder Presses 14. Bent Over Rows with Triceps Kickbacks 15. Squats 16. Standing Twist 17. Upright Rows 18. Lateral Shoulder Raises 19. Alternating Bicep Curls 20. Dance Basic 2 21. Run and Walk (long)

APPENDIX C: WEEKLY SEQUENCE OF INTERACTIVE GAMES

WEEKS: 1-2

WEEK	ACTIVITY	PROPS	PROCESSING AND DEBRIEF
ONE	Group Juggle with Warp Speed	Koosh Balls Rubber Animals Stopwatch	<p>Group Juggle: How did we do? What did we do to improve our process? How does this remind you of real life? What things do you find yourself “juggling” in your life? How successful are you?</p> <p>Handshakes: Lumberjack Handshake: Describe the first car you ever owned; Fisherman Handshake: Discuss why you wanted to get involved with the LIFE program; Top Gun Handshake: What would be your call sign? Mistake Handshake: Discuss something you have seen change in the world in the last 10 years.</p>
	Handshakes		
TWO	Card Mixers	Playing Cards	<p>Card Mixers: Find 3 things you have in common with your partner; Talk about one thing you find challenging in obtaining better health; Discuss your favorite foods; talk about the last time you went on a trip.</p>
	Geography	Webbing	<p>Geography: Make a “map” of a place you have visited or a place that is important to you and share with your group</p> <ul style="list-style-type: none"> • Where you were born • A place you have visited • Where you went on your last vacation • A place you worked or live

WEEKS: 3-7

WEEK	ACTIVITY	PROPS	PROCESSING AND DEBRIEF
THREE	Peek a Who Are you more like? Take Ten	Tarp Webbing Koosh balls Playing Cards Webbing Music (if available)	Are you more like? An email or a phone call An explorer or a settler An escalator or the stairs Head lights or taillights City lights or stars The accelerator or the brakes Cash or charge? A handwritten or typed letter? The shade or the sun? Tupperware or Ziplock Baggie?
FOUR	Ripples Speed Rabbit		
FIVE	Story Stretch Letter Opener	Coaster set*	Spell as many words as possible in the given amount of time
SIX	Pizza Toss Crosswords	Webbing Coaster Set	Create a crossword using the most tiles you can in 10 minutes
SEVEN	Have You Ever? Get 20	Poly Spots Playing Cards	See handout for “Get 20” activities

WEEK: 8

WEEK	ACTIVITY	PROPS	PROCESSING AND DEBRIEF
EIGHT	Key Punch	Poly Spots Stopwatch Webbing	Key Punch How did it go? What was your team's plan for getting a lower time? Was there a leader? How did they lead? What was your individual role? How does the role you played relate to the role you typically play in life? Similar or Different?
	Pass the Knot (Final debrief)	Webbing	Pass the Knot What have you enjoyed about the program? What have you learned? What is a future goal you have?

APPENDIX D: QUALITATIVE EVALUATIONS



Participant Post Evaluation Form

This evaluation form is intended to help determine the aspects of the LIFE Program you enjoyed and those you did not. Please answer this questionnaire honestly, as your comments will help us improve the program.

Thank you again for participating in this program.

Total Pages (including cover page) = 4

Please **circle** the choice that best answers the question.

1. I decided to participate in the on-site LIFE Program because (check all that apply):

- a. I have a health condition my health care provider said would be helped by physical activity (e.g. diabetes, heart disease, osteoporosis) (1)
- b. It seemed like it would be a fun way to socialize (2)
- c. It was provided at a convenient location and time (3)
- d. All of the above (4)
- e. None of the above (5)

2. The on-site LIFE Program was long enough for me to make changes in my physical activity:

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

3. The length of the on-site LIFE sessions (30-60 minutes/session) was:

- a. Too long; **please answer 3a** (1)
- b. Too short; **please answer 3b** (2)
- c. The right length (3)

3a. If you said the on-site LIFE sessions were too long, how long do you think they should last?

_____ hours _____ minutes

3b. If you said the on-site LIFE sessions were too short, how long do you think they should last?

_____ hours _____ minutes

Office Use
Only

PEVAL1

PEVAL2

PEVAL3

PEVAL3A

PEVAL3B

4. The aspect I liked best about the on-site LIFE Program was:

Office Use
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PEVAL4

5. The aspect I liked least about the on-site LIFE Program was:

PEVAL5

6. Do you feel you made changes (positive and negative) in your daily routine as a result of the on-site LIFE Program?

PEVAL6

- a. Yes, positive; **please answer 6a** (1)
- b. Yes, negative; **please answer 6b** (2)
- c. Yes both positive and negative; **please answer 6a and 6b** (3)
- d. No (4)

6a. What perceived positive changes did you make in your daily routine?

PEVAL6A

6b. What perceived negative changes did you make in your daily routine?

PEVAL6B

7. In addition to the program materials, during the course of the LIFE Program I sought physical activity/health information from (check all that apply):

PEVAL7

- a. I did not seek extra physical activity/health information (1)
- b. The television (2)
- c. Magazines (3)
- a. Health professionals (e.g. doctor, nurse, dietitian, personal trainer) (4)
- b. Other _____

8. Overall, I thought the on-site LIFE Program was:

- a. Excellent (1)
- b. Good (2)
- c. Okay (3)
- d. Can be improved (4)

9. I would recommend the on-site LIFE Program to a friend.

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

10. Any other comments:

Office Use Only
PEVAL8
PEVAL9
PEVAL10



Participant Follow-Up Evaluation Form

This evaluation form is intended to help determine the aspects of the LIFE Program you enjoyed and those you did not. Please answer this questionnaire honestly, as your comments will help us improve the program.

Thank you again for participating in this program.

Total Pages (including cover page) = 4

Please **circle** the choice that best answers the question.

1. I decided to participate in the LIFE Program because (*check all that apply*):

- a. I have a health condition my health care provider said would be helped by physical activity (e.g. diabetes, heart disease, osteoporosis) (1)
- b. It seemed like it would be a fun way to socialize (2)
- c. It was provided at a convenient location and time (3)
- d. All of the above (4)
- e. None of the above (5)

2. The LIFE Program was long enough for me to make changes in my physical activity:

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

3. The length of the onsite LIFE sessions (30-60 minutes/session) was:

- a. Too long; **please answer 3a** (1)
- b. Too short; **please answer 3b** (2)
- c. The right length (3)

3a. If you said the sessions were too long, how long do you think they should last?

_____ hours _____ minutes

3b. If you said the sessions were too short, how long do you think they should last?

_____ hours _____ minutes

Office Use
Only

PEVALFU1

PEVALFU2

PEVALFU3

PEVALFU3A

PEVALFU3B

4. The follow-up newsletters (*LIFE Lessons*) were:

- a. Not helpful; I did not find the information relevant to my lifestyle (1)
- b. Helpful; it reinforced what I already knew (2)
- c. Very helpful; it provided me with tips on how to live a more healthy lifestyle (3)

5. The aspect I liked best about the LIFE Program was:

6. The aspect I liked least about the LIFE Program was:

7. Do you feel you made changes (positive and negative) in your daily routine as a result of the LIFE Program?

- a. Yes, positive; **please answer 7a** (1)
- b. Yes, negative; **please answer 7b** (2)
- c. Yes both positive and negative; **please answer 7a and 7b** (3)
- d. No (4)

7a. What perceived positive changes did you make in your daily routine?

7b. What perceived negative changes did you make in your daily routine?

Office Use
Only

PEVALFU4

PEVALFU5

PEVALFU6

PEVALFU7

PEVALFU7A

PEVALFU7B

8. In addition to the program materials, during the course of the LIFE Program I sought physical activity/health information from (check all that apply):

- a. I did not seek extra physical activity/health information (1)
- b. The television (2)
- c. Magazines (3)
- d. Health professionals (e.g. doctor, nurse, dietitian, personal trainer) (4)
- e. Other _____

9. Did you participate in the on-site LIFE Program led by the on-site program leader?

- a. Yes (1)
- b. No (2)

9a. If you answered NO to the question above, why did you not participate in the on-site program led by the on-site program leader?

- a. The program was not offered (1)
- b. I did not continue going to the program site (2)
- c. I did not enjoy the program (3)
- d. Other _____

10. Overall, I thought the LIFE Program was:

- a. Excellent (1)
- b. Good (2)
- c. Okay (3)
- d. Can be improved (4)

11. I would recommend the LIFE Program to a friend.

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

12. If the LIFE Program (including newsletters) was offered as a fee-based service, what do you think the cost should be?

\$ _____

Office Use
Only

PEVALFU8

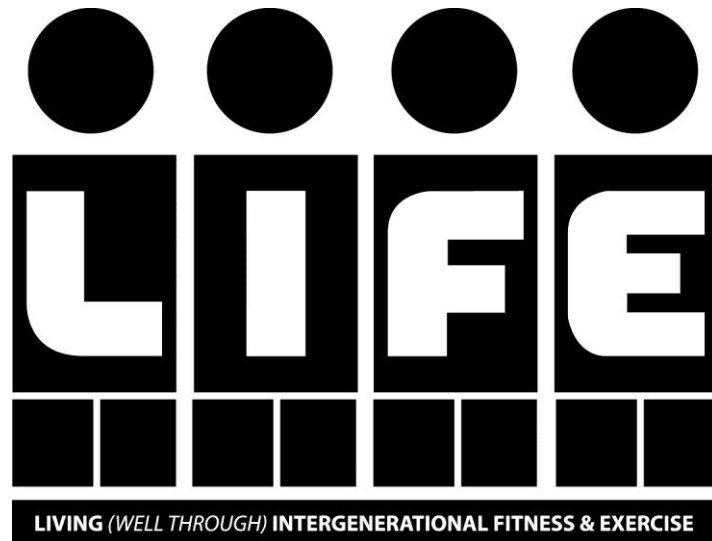
PEVALFU9

PEVALFU9A

PEVALFU9

PEVALFU11

PEVALFU12



ON-SITE LEADER EVALUATION FORM

This evaluation form is intended to help determine the aspects of serving as an on-site LIFE Program leader you enjoyed and those you did not. Please answer this questionnaire honestly, as your comments will help us improve the program.

Thank you again for participating in this program.

Total Pages (including cover page) = 4

Please **circle** the choice that best answers the question.

	Office Use Only
<p>1. I decided to volunteer as an on-site LIFE Program leader because (<i>check all that apply</i>):</p> <ul style="list-style-type: none"> a. I enjoy physical activity (1) b. It seemed like it would be a fun way to socialize (2) c. I like volunteering (3) d. I wanted to make sure the program continued after the youth trainers left (4) e. All of the above (5) f. None of the above (6) 	OSL1
<p>2. The on-site training program prepared me to handle the responsibilities of being an on-site LIFE Program leader:</p> <ul style="list-style-type: none"> a. Strongly agree (1) b. Agree (2) c. Undecided (3) d. Disagree (4) e. Strongly disagree (5) 	OSL2
<p>3. I feel my peers listened to me when I tried to encourage them through the selected activities:</p> <ul style="list-style-type: none"> a. Strongly agree (1) b. Agree (2) c. Undecided (3) d. Disagree (4) e. Strongly disagree (5) 	OSL3
<p>4. I feel my peers listened to me when I tried to help them correct an error while performing one of the selected activities:</p> <ul style="list-style-type: none"> a. Strongly agree (1) b. Agree (2) c. Undecided (3) d. Disagree (4) e. Strongly disagree (5) 	OSL4

5. Serving as an on-site LIFE Program leader helped me feel good about myself:

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

6. The aspect I liked best about serving as an on-site LIFE Program leader was:

7. The aspect I liked least about serving as an on-site LIFE Program leader was:

8. Do you feel you like you had enough support from the facility staff available at the program's location?

- a. Yes (1)
- b. No (2)

8a. If you answered YES, what did the staff do to offer support?

8b. If you answered NO, what support did you need but not receive?

9. Did you continue the program after the on-site trainer left?

- a. Yes (1)
- b. No (2)

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OSL5

OSL6

OSL7

OSL8

OSL8A

OSL8B

OSL9

9a. If you answered YES, how often did you lead the LIFE Program?

- c. Once weekly (1)
- d. Twice weekly (2)
- e. Other _____

OSL9A

9b. If you answered NO, why did you choose not to lead the LIFE Program?

- a. No one came to the sessions(1)
- b. I did not have the time (2)
- c. I did not receive support by the location's staff (3)
- d. Other _____

OSL9B

10. Overall, I enjoyed serving as an on-site LIFE Program leader.

- a. Strongly agree (1)
- b. Agree (2)
- c. Undecided (3)
- d. Disagree (4)
- e. Strongly disagree (5)

OSL10

11. I will continue hosting the LIFE Program even after the study is completed.

- a. Yes (1)
- b. No (2)
- c. Undecided (3)

OSL11

11a. If you answered NO, why have you chosen to not continue the LIFE Program?

OSL11A

11b. If you answered UNDECIDED, what would encourage you to continue the LIFE Program?

OSL11B

APPENDIX E: LIFE LESSONS WELLNESS NEWSLETTERS



Issue 01: Fitness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

What does exercise mean to you?

Some think of a sport, like football, while others think of the physical education class they had in high school. Still others think of “working out” such as going for a brisk walk, lifting weights, or visiting a gym. On the other hand, how many people think of mowing the lawn, cleaning the house, weeding the vegetable garden or feeding the hogs?

All these activities are exercise. But how can that be—how can weeding the garden and working out at the gym both be exercise? While many folks do not think of it this way, “exercise” includes many more activities than just working out. In fact, a better term than “exercise” is “physical activity.” Both exercise and physical activity mean that you are moving your body. However, many people associate exercise with unpleasant things—perhaps being hot, tired, and sweaty after doing something you did not especially want to do—but do not feel that way when they hear the word “activity.”

Why should I be physically active?

Physical activity (or exercise) can help you stay healthy or become healthier. That’s what weeding the garden and going to the gym both have in common. Of course, they

are two very different types of physical activity but, in their own way, each is a good thing for you to do. How can these activities help to make you healthier? Both help reduce your risk of chronic disease.

A hundred years ago, infectious diseases such as pneumonia, influenza and tuberculosis were major contributors to deaths in the United States. The development of antibiotics and better health care dramatically reduced the number of deaths associated with infectious diseases. Consequently, more people die today from chronic diseases than from infectious diseases. For example, heart disease, cancer, and stroke account for more than half of all deaths in the United States today.

What does lifestyle have to do with it?

A large majority of these deaths are preventable with simple changes in lifestyle. In fact, four lifestyle habits are responsible for much of the illness, suffering, and early deaths seen today. These habits are:

- Physical inactivity
- Poor nutrition
- Tobacco use (of any kind)
- Excessive consumption of alcohol

How much physical activity do I need?

Almost 100 million Americans do not get enough physical activity. This number is very large, representing about one-third of the United States. This is avoidable, since it is not that hard to get enough physical activity.

A simple, but very helpful, way to increase your activity is to try to incorporate brief bouts of physical activity into your daily life. The goal is to spend about 30 minutes a day doing some sort of activity. It doesn’t need to be 30 minutes all at once; several shorter sessions of activity work almost as well. Some examples are parking at the far end of the parking lot and walking into the store, taking the stairs instead of the elevator and, when watching TV, doing some stretches during the commercials. These simple lifestyle changes can go a long way toward helping you to becoming more active—and becoming healthier.

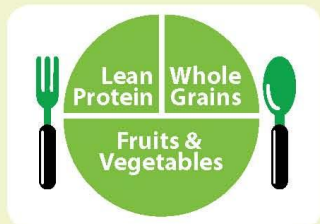


IOWA STATE UNIVERSITY
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Issue 01: Nutrition

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Creating a Healthy Plate: Introduction



Choosing what and how much to put on your dinner plate is like putting a puzzle together.

Individual puzzle pieces make a picture when put together. To create a picture-perfect plate and stay healthy, you need to use pieces from each food group. Eating a varied diet helps us get the nutrients we need to protect against chronic diseases, stay active, and maintain mental alertness.

Each puzzle piece varies in shape and size.

To create a healthy plate, cover half of it with fruits and vegetables, one-quarter with lean protein, and the other quarter with whole-grains.

Each puzzle piece contains a different part of the picture.

A puzzle would not be very attractive if it was all the same color. And our diets would be boring if we ate the same thing every day. Eating a variety of foods from all the food groups ensures that you are getting the nutrients your body needs. For example, dark green, leafy vegetables are good sources of iron that prevents anemia. Orange and yellow vegetables, like carrots or sweet potatoes, are filled with vitamin A that helps maintain eyesight. Choosing lean protein like fish, chicken, and dried beans provides vitamin B12 that keeps our brain healthy. For healthy intestines, choose whole-grain cereals, crackers, rice, or pasta.



It's a Meal Strata (4 servings)

INGREDIENTS:

- 1 teaspoon vegetable oil
- 3 cups chopped vegetables
- 1 clove garlic, minced or 1/4 teaspoon garlic powder
- 1 3 oz. package (or 1/2 of 8 oz. package) light cream cheese
- 3 eggs
- 1 cup cubed day-old bread (about 1 slice)
- 1/3 cup cubed cooked ham
- 1/8 teaspoon pepper
- 1/3 cup shredded Cheddar cheese

DIRECTIONS:

1. Preheat oven to 350°F.
2. Cut the vegetables so they are about the same size.
3. In a large skillet, heat oil over medium-high heat. Add the vegetables and garlic and cook, stirring occasionally, until vegetables are tender. Turn off heat and pat the vegetables with paper towels to remove the moisture. Set aside.
4. In a large bowl, beat the cream cheese until smooth. Add eggs and beat well.
5. Stir in vegetables, bread, cubed ham, and pepper.
6. Pour into a greased 8"x 8" baking dish or small casserole dish.
7. Bake, uncovered, for 10 to 15 minutes or until the egg mixture doesn't jiggle. Remove from heat, sprinkle on the cheese and let stand for 5 to 10 minutes before serving.

Nutrient Analysis (per serving): 204 calories, 12.6g total fat, 5.7g saturated fat, 186.7mg cholesterol, 422.4 mg sodium, 9.9g total carbohydrates, 1.5g fiber, 13.3g protein. Source: <http://recipes.extension.iastate.edu/2010/09/15/its-a-meal-strata/>

A "healthy plate" makes a healthier YOU!

Prepared by: Kara Strand, Warren Franke, PhD, FACSM and Sarah L. Francis PhD, RD ISU. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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Issue 01: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Successful Aging for Everyone

Americans are aging.

It is expected that by 2030, about 20 percent of the population will be age 65 or older. When you think about age, a number often comes to mind. Instead of focusing on a number, focus on the quality of life while getting older.

Quality of life has a different meaning for everyone. For the LIFE Program, we think of quality of life as being able to continue with activities that

make us happy and that our health (physical, mental, and emotional) is good. We often use the term "successful aging" to help explain quality of life. Successful aging means that a person has a lower risk of disease or disability, is able to maintain mental and physical health, and is engaged with life.

Being physically active, joining in activities requiring mental focus (like card games), and being social

can all help us age successfully. Staying well can help achieve and maintain a higher quality of life while growing older.

References: Federal Interagency Forum on Aging Related Statistics. 2010 Older American Update: Older Americans 2010: Key Indicators of Well-Being. Accessed at Federal Interagency Forum on Aging Related Statistics at http://www.agingstats.gov/agingstatsdotnet/Main_Site/Data/2010_Documents/Docs/OA_2010.pdf Rowe, J.W., & Kahn, R.L. (1998). *Successful Aging*. New York: Pantheon.

The Secret to the Fountain of Youth

Despite what you may have heard, you can teach an "old dog" new tricks.



Quality of life has a different meaning for everyone.

Growing and developing don't just happen when we're young. Our brains continue to grow throughout our lives.

What's the secret?

We must continue to use and challenge our brains so that new brain cells will grow. We can do this by continuing to participate in activities we enjoy.

Here are a few ideas:

- Work on puzzles (crosswords, word finds, Sudoku, jigsaw puzzles)
- Play trivia games
- Read books, magazines, and newspapers
- Join or start a book club with friends
- Learn to play an instrument
- Try new recipes
- Volunteer in the community
- Visit museums
- Attend lectures and educational programs
- Travel to places near and far

Reference: Stay Mentally Active. (2010). Alzheimer's Association. Retrieved from http://www.alz.org/we_can_help_stay_mentally_active.asp

Issue 01: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

TAKE FIVE: Helpful Resources & Word Puzzle



Here are two websites that provide information about how to make sure your golden years are happy and healthy. If you don't have a computer at home, call your local library. Often, libraries will have computers available for the public to use. If you don't know how to use a computer, your librarian will be able to help you get started. Other good places to seek information about aging are your local Agency on Aging or Department on Aging.

• **National Institutes of Health:**

This user friendly website focuses on a variety of topics regarding older adults' health. <http://health.nih.gov/category/SeniorsHealth>

• **Alzheimer's Association:**

A non-profit organization that funds research on Alzheimer's disease. Information can be found related to brain health, strategies and tools for coping with Alzheimer's disease, and professional resources. <http://www.alz.org/index.asp>

These websites offer interactive computer games that are meant to challenge your brain:

- <http://games.aarp.org/>
- <http://www.nytimes.com/pages/crosswords/>
- <http://www.sharpbrains.com/teasers/>
- <http://www.thirdage.com/games/>

COMPLETE A WORD PUZZLE

A great way to exercise our brains is to complete puzzles. Try solving this one about how to age successfully.

Find these words:

EXERCISE FRIENDS LONGEVITY MEMORY PUZZLES WELLNESS

L	E	L	J	U	C	F	A	Y	P
H	G	X	K	H	R	F	T	P	U
E	P	P	E	I	T	I	V	Q	Z
X	V	A	E	R	V	A	W	T	Z
A	Z	N	K	E	C	F	U	K	L
J	D	V	G	P	C	I	Y	L	E
S	B	N	H	Z	T	Y	S	K	S
T	O	J	P	Y	R	O	M	E	M
L	C	V	U	P	N	K	V	N	U
W	E	L	L	N	E	S	S	P	I

Prepared by: Jennifer Margrett, PhD, Jennifer Senia, and Sarah L. Francis, PhD, RD. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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ANSWERS:

I	P	S	S	E	N	L	L	E	W
U	N	A	K	N	P	U	A	C	L
W	E	W	O	R	Y	J	I	O	T
S	K	S	A	T	Z	H	N	B	S
E	L	A	I	C	P	G	A	D	J
L	K	U	F	C	E	K	N	Z	A
Z	T	W	A	V	R	E	A	V	X
Z	Q	V	I	T	I	E	P	P	E
U	P	T	F	R	H	K	X	G	H
P	Y	A	F	C	U	J	L	E	L



Issue 02: Fitness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Get Fit to Get Healthy

What does “being fit” mean?

If someone is very strong, does that mean he is fit? If someone is able to run a marathon, is she fit? In both cases, the answer is “sort of.” That is because the word “fit” means many different things. There are actually five components to fitness:

1. Muscular strength
2. Muscular endurance
3. Cardiovascular endurance
4. Flexibility
5. Body fatness

So, someone who is very strong but overweight is fit in one way (muscular strength) but not fit in another way (body fatness). Likewise, someone who is lean but quite weak is fit in one way but not in another. Consequently, if someone wanted to really be fit, that person would have to be able to do well in all five components.

How important is it to be fit in all five areas of fitness?

If you are an athlete, it is important since you will have an advantage over your competitors. For most of us, it is not critical that we be as strong as an ox, as flexible as a gymnast, and able to run a marathon. Few people have the time and energy to devote to developing this level of all-around fitness. However, if

your goal is to stay healthy, it is worthwhile to be reasonably fit in all these areas.

Why is “being fit” important?

Each component of fitness is associated with a higher quality of life. For example, being strong makes it easier to do things like open a stubborn jar or pick up a heavy bag of groceries. Likewise, having some muscular endurance means that repetitive chores, such as raking leaves, are not quite as difficult as they might otherwise be. Cardiovascular endurance is helpful when you have to be “on the move” for an extended period of time, such as when you take your children or grandchildren to the park to play. Flexibility may come in handy when tying your shoes or bending over to pick up something from the floor. Finally, not having too much body fatness may make it easier for you to get around. So, having a good all-around level of fitness makes life a bit easier (and perhaps more fun!)

Moreover, there are health benefits to each component of fitness. Getting stronger helps you to reduce your risk of osteoporosis, since the stresses placed on your bones when you exercise help them to stay stronger too. Improving your cardiovascular endurance by, say, walking helps to reduce your risk for chronic diseases like heart disease, stroke, diabetes,

high blood pressure, and obesity. Improving flexibility is one way to reduce back pain, which afflicts almost 85% of us at least once in our lives. Finally, having a normal level of body fatness is also associated with declines in all the risk factors. Of course, another major chronic disease, obesity, is what occurs when this does not happen. Unfortunately, at least 1/3 of Americans are obese.

So, even if you do not care about being fit but you do care about staying healthy, it is in your best interests to try to work on all five components of fitness!



IOWA STATE UNIVERSITY
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Issue 02: Nutrition

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Creating a Healthy Plate: Fruits & Vegetables

**Creating a Colorful Plate**

The vibrancy of bright blues, radiant reds, and gorgeous greens is hard to resist. By filling at least half of your plate with colorful fruits and vegetables, you are sure to have the variety of nutrients you need to stay mentally and physically healthy—not to mention a very eye-appealing plate!

Dish up a creative, colorful plate using these colors as a guide:

Red: Grapefruit, watermelon, and tomatoes help reduce the risk of several cancers, while strawberries, cherries, and red grapes help keep your heart healthy and help slow mental and physical declines.

Orange and yellow: These colors are loaded with vitamin A, which help maintain eye health, reduce risk of cancers, and improve immune function. This group of colors includes carrots, squash, and sweet potatoes.

Green: Fruits and vegetables such as celery, peas, spinach, green peppers, kiwi, and honeydew are packed with nutrients that can help reduce the risk of macular degeneration, the leading cause of blindness in older adults, and protect against certain cancers.

Blue and Purple: The pigments found in blueberries, figs, plums, and prunes contain powerful antioxidants, which help protect our cells from damage. These


Strawbosia Parfait
 (3 servings -1/2 cup each)
INGREDIENTS:

- 1 cup sliced strawberries
- 1/2 banana, sliced
- 1/2 orange, peeled and sliced (or 4 oz. can mandarin orange segments)
- 1/2 cup cubed pineapple, fresh or canned
- 1/2 cup (4 oz. carton) non-fat vanilla or lemon yogurt
- 2 tablespoons Grape Nuts
- 3 mint sprigs (optional)

DIRECTIONS:

1. In a bowl, mix strawberries, banana, orange and pineapple. Pour orange juice over fruit and toss. Refrigerate until chilled.
2. To prepare parfaits: Divide one half of the fruit mixture equally into 3 parfait glasses. Top with heaping tablespoon of yogurt. Add remaining fruit divided equally; top with remaining yogurt. Sprinkle each parfait with Grape Nuts. Garnish each parfait with a mint sprig.

Nutrient Analysis (per serving): 110 calories, 0g total fat, 0g saturated fat, 0mg cholesterol, 60mg sodium, 26g total carbohydrate, 3g fiber, 3g protein. Source: <http://apps.nccd.cdc.gov/dnparecipe/recipesearch.aspx>

A “healthy plate” makes a healthier YOU!

pigments have also been found to reduce the risk of cancers, stroke, and heart disease.

White: Although not as bright as other fruits and vegetables, onions, bananas, cauliflower, and turnips may help lower cholesterol levels and reduce blood pressure.

Source: <http://www.ag.ndsu.edu/pubs/yf/foods/fn595.pdf>

Prepared by: Kara Strand, Warren Franke, PhD, FRCSM and Sarah L. Francis PhD, RD ISU. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.



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Issue 02: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Successful Aging for Everyone

What Did I Come in Here for Again?

Does it seem like you are asking yourself that question more often? Most of us experience some changes in our memory as we get older, as well as how quickly we can process new information. This is a natural part of aging. These changes can be made worse by medications, depression, lack of sleep, and an inadequate diet.

It is important to talk to your healthcare provider about any changes you have

in memory or your thought process. These could be signs of a more serious condition like dementia. Talk with your healthcare provider if you are:

- Having difficulties with judgment (e.g., problems making decisions, bad financial decisions, problems with thinking)
- Less interested in hobbies or activities you once enjoyed
- Repeating yourself (e.g., asking the same questions, telling the same stories, or making the

same statements)

- Regularly forgetting what day, month, or year it is
- Having trouble handling your finances (e.g., balancing checkbook, filing your income taxes, remembering to pay your bills on time)
- Forgetting your appointments
- Having daily problems with your thinking or your memory

Reference: Galvin JE et al, (2005). The AD 8, a brief informant interview to detect dementia. *Neurology*, 65:559-564.

Tips for Improving Memory



Just because your age can affect your memory doesn't mean it has to. You can improve your memory by exercising your brain daily, and staying physically and mentally healthy.

1. Boost Your Brain Power

• Practice makes perfect

Have you ever repeated a phone number over and over to yourself? Rehearsing or practicing information is a great strategy to improve your memory. If you learn best by listening, recite information you want to remember. If you learn

best by seeing, visualize the information to help you remember. Continue to rehearse information on a regular basis to help you remember it longer.

• Make your own mental shortcuts

Mnemonics are memory shortcuts you can create. For example, have you heard of Roy G. Biv? This is not a famous person, but a mental shortcut to help remember the colors of the spectrum: Red, Orange, Yellow, Green, Blue, Indigo, and Violet (ROYGBIV).

(continued on backpage)

Issue 02: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Tips for Improving Memory: Continued

(Tips: continued)

Try to think of rhymes and poems for things you need to remember. Be creative! The only rule is to make the mental shortcut something meaningful to you. You can tie information you want to remember to names as well as songs, poems, sentences, and visual images.

• **Here's a familiar trick:**

30 days hath September,
April, June, and November.
All the rest have 31
Except February my dear son.
It has 28 and that is fine
But in Leap Year it has 29.

• **Here is a mnemonic to help remember how to spell: RHYTHM**
Rhythm Helps Your Two Hips Move

2. Rest, Eat, Talk

• **Get plenty of restful sleep**

Your brain cannot function at its best if your body is tired.

• **Eat well and regularly**

Changes in blood sugar levels can affect our thinking as well as how well we can solve problems.

• **Understand your medications**

Talk to your healthcare provider and pharmacist about all your prescription and over-the-counter medication (including vitamin, mineral, and herbal supplements). Some medications (alone or in combination) can have an impact on your thinking and problem-solving abilities.

3. Put Yourself First

• **Be good to yourself**

When you're stressed, your brain can't function at its best. Try counting, deep breathing, or meditation to reduce stress.

• **Get rid of distractions**

It is more difficult to think when we are distracted. Turn off the TV when having a conversation. Turn off the car radio to focus on traffic.

• **Take a breather**

"Senior moments" are not just for older adults—they happen to people of all ages! When you can't remember, take a deep breath. Come back to the item later. When you are relaxed, you will be able to think more clearly.

Reference: Winningham, R. G. (2010). Train Your Brain, "Practical tips to improving the ability to make new memories" (pp.133-143). Amityville, NY: Baywood Publishing Company.

TAKE FIVE: Making Mental Shortcuts (Mnemonics)

Using the items below, make up a mnemonic for remembering each piece of information. Try making a mnemonic without changing the order and then a few in which you reorganize the items to fit your mnemonic.

1. **Six Food Groups:** Vegetables, Fruits, Whole Grains, Meats, Dairy, Extras (VFWMDE)

2. **Six Areas of Wellness:** Physical, Emotional, Spiritual, Intellectual, Occupational, and Social (PESIOS)

3. **Five Components of Fitness:** Muscular Strength, Muscular Endurance, Cardiovascular Endurance, Flexibility and Body Fatness (MSMECEFBF)

Prepared by: Jennifer Margrett, PhD, Jennifer Senia, and Sarah L. Francis, PhD, RD . Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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Issue 03: Fitness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Should I lift weights?

Is it important to be physically strong?

Regardless of someone's age, being stronger has a number of benefits to improve your everyday life. For example, it is easier to do chores, like bringing the groceries in from the car or getting out of a chair, if you are stronger. But strength training goes beyond this – it can have a profound effect on physical and mental health. Even people with health concerns can benefit from an activity program that includes lifting weights.

Considerable research has shown that, when done correctly, lifting weights can help reduce the pain of arthritis. It can also help people recover from a heart attack; improve blood sugar control in people with Type II diabetes; improve mood in people with mild depression; improve sleep quality; help reduce bone loss in older women; and improve balance to reduce the risk of falls. For many people, this last reason may be the most important. Becoming stronger can help reduce the risk of falling while at home, becoming injured, and having to move into a nursing home. Therefore, it is important that everyone, regardless of their age, do some strength training exercises.

Is there anything I need to do before starting a strength training program?

Before you begin any new activity, it's always a good idea to check with your health care provider. This is especially true if you have any of the following:

- a cold, flu, or infection accompanied by fever
- significantly more tiredness than usual
- a swollen or painful muscle or joint
- any new or undiagnosed symptom
- chest pain, or irregular, rapid, or fluttery heartbeat
- shortness of breath
- a hernia, with symptoms
- advice from your health care provider not to exert yourself for a given period of time due to illness, surgery, etc.

I'm scared for strength training, so what do I do next?

Once you have been given the go-ahead, the next step is to make an appointment with yourself. Set aside a specific time to do your strength training on two or three non-consecutive days a week (like Monday, Wednesday, and Friday). By writing it on your calendar, just like a doctor's appointment, you are more likely to "make the appointment" and stick with the program.

After that, think about the equipment you will need. For most of the exercises, you will either move your body or move a weight. So, besides comfortable clothes and shoes, you'll need a stable, sturdy chair without arms and some weights. You may already have the chair, perhaps in your kitchen or dining room, and while dumbbells would be ideal, you could use items you already have like books, full cans of soup or milk cartons with water in them. How much weight is enough? Start out with a minimum of weight (about 1 or 2 pounds) so you do not get hurt. The weights of some common household items are listed below.

- 1 can of soup = 1/2 pound
- 80 quarters = 1 pound
- 150 pennies = 1 pound
- 1 gallon of water = 8 pounds

Finally, what should you do? We will review the actual exercises in the next newsletter. Until then, continue to work on being physically active (which was discussed in the previous newsletter).

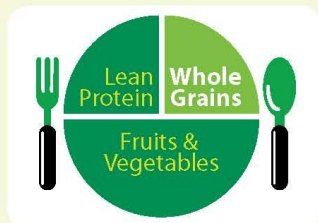
References: Centers for Disease Control and Prevention. Growing stronger—strength training for older adults. <http://www.cdc.gov/physicalactivity/growingstronger/> Seguin, R.A., Epping, J.N., Buchner, D.M., Bloch, R., Nelson, M.E. Growing Stronger—Strength training for older adults. 2002. Available at: http://www.cdc.gov/physicalactivity/downloads/growing_stronger.pdf

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Issue 03: Nutrition

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Creating a Healthy Plate: Whole Grains

**The “Whole” Story**

MyPyramid recommends six ounces of grains a day, and half of those need to be whole-grains. Filling one-fourth of your dinner plate with whole-grains will help you meet that goal. The term “whole-grain” means the grain has the entire grain kernel—the bran, endosperm, and germ. Together, these parts of the kernel provide essential vitamins, fiber, and other nutrients we need to stay healthy. Whole-grains provide your body with the energy it needs to stay active during the day as well as help reduce the risk of heart disease, diabetes, and certain cancers. The fiber in the whole-grains also helps keep you regular. Eating whole-grains will help you reach the recommended intake of 20-30 grams of fiber per day.

One ounce of whole-grain is...

- 1 slice of 100% whole-grain bread
- 1 cup of 100% whole-grain cereal
- 1/2 cup of oatmeal, cooked
- 1/2 cup cooked whole-grain pasta, brown or wild rice, or other grain
- 3 cups popped popcorn
- 5 whole-grain crackers

Try these fun and easy ways to increase your whole-grain intake.

- Choose whole-grain bread more often than white bread
- When making pasta or rice, substitute half with whole wheat pasta or brown rice
- Add whole-grains to mixed dishes, such as barley in vegetable soup or stews

Banana Bread Oatmeal
(2 servings)**INGREDIENTS:**

- 1 cup fat-free milk
- 1 tablespoon firmly packed brown sugar
- 1/4 teaspoon ground cinnamon
- Pinch of ground nutmeg (to taste)
- 2/3 cups oatmeal (quick or old fashioned, uncooked)
- 1 mashed ripe banana
- 2/3 tablespoons coarsely chopped toasted pecans
- Plain or vanilla nonfat yogurt (optional)
- Banana slices (optional)
- Pecan halves (optional)

DIRECTIONS:

1. In medium saucepan, bring milk, sugar, salt and spices to gentle boil (watch carefully); stir in oats. Return to boil; reduce heat to medium. Cook 1 minute for quick oats, 5 minutes for old fashioned oats or until most of liquid is absorbed, stirring occasionally.
2. Remove oatmeal from heat. Stir in mashed bananas and pecans. Spoon oatmeal into two cereal bowls. Top with yogurt, sliced bananas and pecan halves, if desired.



**RECIPE CONTAINS
THESE FOOD GROUPS**
Whole Grain, Fruit, & Dairy

Nutrient Analysis (per serving): 220 calories, 3.5g total fat, 0.5g saturated fat, 5mg cholesterol, 55mg sodium, 40g total carbohydrates, 4g fiber, 8g protein. Source: <http://www.quakeroats.com/cooking-and-recipes/content/recipes.aspx>

Quick Tip:

1 slice of whole wheat bread has as much fiber in as 8 slices of white bread!

Prepared by: Kara Strand, Warren Franke, PhD, FACS and Sarah L. Francis PhD, RD ISU. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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Remember, if you are not used to a lot of fiber, slowly increase your intake. Also, drink plenty of fluid to prevent stomach discomfort.



Issue 03: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Successful Aging for Everyone

A Winning Combination

A whole-person approach is very useful in keeping our brains fit throughout life. Physical and mental fitness, good nutrition, and social interaction help keep our brains healthy, especially if we do our best in all of these areas. It's never too early or too late to practice healthy habits. Engaging in daily physical activity and watching what we eat contribute to good thinking!



Brain-Boosting Foods

Often we think of diet as a way to control our weight, protect our hearts, or to prevent cancer. What we eat also has an impact on

our brain. Research shows that what we eat can keep our brain cells healthy. All fruits, vegetables, lean proteins, and whole grains help us stay healthy. But some foods show more "brain benefit" than others. The next time you are planning a menu try using these "brain friendly" foods:

- Brightly colored fruits and vegetables (broccoli, spinach, blueberries, red grapes)

Combining Exercise with Everyday Activities

Source: The National Institute on Aging: Exercise and Physical Guide Activity

Endurance(aerobic) activities:

- Dancing
- Yard work
- Playing with your grandchildren at a local park

Flexibility(stretching)activities:

- Bending over to tie your shoe
- Yoga
- Shoulder and arm stretches

Strength training activities:

- Practicing with a resistance band
- Carrying groceries or laundry from one floor to the next

Balance(coordination) activities:

- Stair walking
- Tai Chi

- Cold water fish (canned salmon or tuna is fine)
- Nuts (almonds and walnuts)

Physical Exercise Benefits More Than Your Body!

Regardless of your age and fitness level, physical activity is important in improving and maintaining our health. Being physically active also:

- Improves our mood and outlook on life
- Keeps our brain working at its best

- Allows us to continue doing activities we enjoy without depending on others

In order to stay healthy, the Centers for Disease Control and Prevention recommends 150 minutes of weekly physical activity (including strength training) for those age 65+. This activity can be completed through traditional programs (e.g. water aerobics, LIFE Program, walking club) as well as daily activities and chores.

Issue 03: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

TAKE FIVE: Test Your Health Know-How



1. What is the best way to keep our minds strong and healthy?

- A. Think in new ways
- B. Change your routine
- C. Turn off the TV
- D. Surprise your senses
- E. All of the above

2. Which of the following has the highest antioxidant potential?

- A. Strawberries
- B. Prunes
- C. Bread
- D. Raspberries

3. What is a good way to get through a lack of exercise motivation?

- A. Willpower
- B. Watch more TV
- C. Eat out more often
- D. Have strategies in place

ANSWERS:

1. E (All of the above)

In order to keep our minds healthy we need to exercise them. Remember:

- **Think in new ways.** Choose activities that make you think in new ways by using your imagination, solving problems, or making connections with information you already know (Ex: crossword puzzles, taking a class, theater).
- **Change your routine.** Make small changes to your daily routine so you are not doing the same thing over and over (Ex: One week buy your produce at a farmer's market instead of going to the grocery store).
- **Turn off the TV.** Watching TV relaxes the mind, it does not exercise it. Instead, pick up a good book, newspaper, or magazine and read.
- **Surprise your senses.** Try activities that involve your senses in new ways. Cook with new herbs and spices; plant and nurture a garden with herbs and fragrant flowers.

2. D (Raspberries)

Antioxidants are natural compounds that protect against heart disease and some cancers. All fruits and vegetables provide antioxidants, vitamins, and minerals our bodies need to stay healthy.

3. D (Have strategies in place)

It's important to have a plan in place to help us achieve our physical activity goals. Strategies include: ask a friend to be your exercise buddy, attend a regular physical activity program, or hire a certified personal trainer.

Prepared by: Jennifer Margrett, PhD, Jennifer Senia, and Sarah L. Francis, PhD, RD. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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Issue 04: Fitness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

How to lift weights

How to start a strength training routine

Strength training is important and should be done two or three times weekly (on non-consecutive days). Try these four exercises following these safety tips:

1. Warm up your muscles for 5 minutes (e.g. walk inside or outside).
2. Complete sets of 8-15 repetitions, followed by about 2 minutes of rest. Listen to your body. If 8 is too difficult do less; 15 too easy, do more.
3. Move the weight smoothly, not "jerkily."
4. Do not lock your elbows, knees or other joints in a straightened position.

If you want more information and have access to the internet, a great resource is <http://www.cdc.gov/physicalactivity/growingstronger/index.html>.

What exercises can I do at home? Squats

1. Stand directly in front of a chair with your feet slightly more than shoulder width apart. Extend your arms so that they are parallel to the ground.
2. Place your weight more on your heels than on the balls of your feet. Bend your knees as you lower your buttocks toward the chair in a slow, controlled motion, while you count to four.



3. Pause. Slowly rise back up to a standing position as you count to two. Keep your knees over your ankles and your back straight. To prevent the chair from moving when you stand, place it against a wall or door.

Easier option: Use your hands to push off the chair or sit on pillows so you do not squat as deeply. **Challenging option:** Place your hands in your lap so you have to use just your legs to stand up.

Wall Push-ups

1. Use a wall that is clear of any objects. Stand a little farther than arm's length from the wall. Face the wall, lean your body forward and place your palms flat against the wall at about shoulder height and shoulder width apart.
2. Bend your elbows and slowly lower your upper body toward the wall as you count to four. Keep your feet planted.
3. Pause. Slowly push yourself back until your arms are straight as you count to four. Make sure you do not lock your elbows.

Easier option: Place your feet closer to the wall. **Challenging option:** Place your feet farther from the wall.



Finger Marches

1. Stand or sit forward in a chair with your feet on the floor. Your feet should be shoulder-width apart.

2. Pretend there is a wall just in front of you that curves over your head. "Touch" the wall and then slowly walk your fingers up the wall and follow the "curve" over your head. Hold your arms overhead while wiggling your fingers for about 10 seconds. Then slowly walk them back down.

Easier option: Hold your arms overhead for 5 seconds. **Challenging option:** Hold your arms overhead for 20 seconds.



Toe Stands

1. Stand with your feet shoulder-width apart near your sturdy chair. Toes are pointing straight ahead. Use the chair for support.
2. Slowly push up as far as you can onto the balls of your feet as you count to four. Hold this position for four seconds.
3. Slowly lower your heels back to the floor as you count to four.

Easier option: Count to two seconds rather than four seconds. **Challenging option:** Put a small book or board under your toes, or use only one leg rather than both.



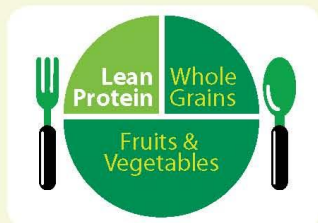
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References: Centers for Disease Control and Prevention. Growing stronger—strength training for older adults. <http://www.cdc.gov/physicalactivity/growingstronger/>. Seguin, R.A., Epping, J.N., Buchner, D.M., Bloch, R., Nelson, M.E. Growing Stronger—Strength training for older adults. 2002. Available at: http://www.cdc.gov/physicalactivity/downloads/growing_stronger.pdf

Issue 04: Nutrition

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Creating a Healthy Plate: Lean Protein

**Protein Possibilities**

Filling one-fourth of your dinner plate with a lean protein is important for maintaining muscle, healing cuts and bruises, and fighting off illnesses. Lean protein is also an excellent source of vitamin B12, which helps support brain health. There are many lean proteins to choose from, including lean cuts of beef, pork, poultry, beans, and nuts. Canned tuna, eggs, and beans are inexpensive sources of protein. Beans and nuts are also rich in other nutrients such as fiber and healthy fats that may help keep you regular, lower blood cholesterol levels, and lower the risk of heart disease. In addition to protein on your plate, drinking a glass of low- or fat-free milk provides protein and calcium.



**RECIPE CONTAINS
THESE FOOD GROUPS**
Lean Protein, Fruit, & Vegetables

Tuna Delight

(2 servings)

INGREDIENTS:

4 oz. solid white tuna in water (drained)
1 tablespoon mayonnaise (light or low-fat)
1 small onion
1/2 cup tomato
1/3 cup cucumber
1/2 medium Granny Smith apple
1/8 cup chopped green chili (optional)
1/2 tablespoon pepper

DIRECTIONS:

1. Mix tuna with light mayonnaise.
2. Cube onion, tomato, cucumber, and apple and add into tuna mix.
3. Cut green chili into fine pieces.
4. Add chilis and pepper to tuna mixture to taste.

This is a very tasty version of traditional tuna salad. You can make it lower in calories and fat by using fat-free mayonnaise. Spread the salad on whole wheat bread or crackers and enjoy!

Nutrient Analysis (per serving): 190 calories, 5g fat, 39mg cholesterol, 392mg sodium, 14g total carbohydrate, 3g fiber, 22g protein.

How do all these protein possibilities compare?

Protein needs for healthy, older adults is as follows: Women-about 46 grams protein daily; Men- about 56 grams protein daily. A serving of meat, pork, poultry, or fish is three ounces (size of a deck of cards); one ounce equals a serving for nuts. Use this table as a guide to help you meet this goal.

FOODS	PROTEIN CONTENT (G)	NUTS	PROTEIN CONTENT (G)	BEANS (1 CUP)	PROTEIN CONTENT (G)
Beef (3 oz.)	21	Peanut Butter (2 tablespoons)	8	Navy	16
Large egg (the protein is in the egg white)	7	Peanuts (1 oz.)	7	Black	15
Milk (1 cup)	8	Almonds (1 oz.)	6	Kidney	13

Prepared by: Kara Strand, Warren Franke, PhD, FACSM and Sarah L. Francis PhD, RD ISU. Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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Issue 04: Wellness

LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE

Successful Aging for Everyone

A Little Help from Our Friends

Our last wellness newsletter talked about the role of physical activity and good nutrition in keeping us mentally fit. Remaining social and engaged in our communities as we grow older is also important. Family and friends are key to helping us stay well as we age. Our social partners can help in many ways:

- **Source of Information.** The people we know can be sources of wellness information and ideas.
- **Identifier of Potential Problems.** Family, friends, and neighbors may notice changes in our mental or physical well-being and alert us to potential problems.
- **Cheerleader.** Enlist your own cheering section. Family and friends can provide us support in achieving our wellness goals.

Have you tried to exercise on your own and found it difficult to stick to your program because of bad weather or lack of time? It is easier to reach our goals if others are counting on us. Working together and sharing wellness goals (physical, emotional, and mental) is a great way to get started and stay motivated.

Join activities that target mental, physical, and nutritional needs:

- Take walks together
- Share recipes and cooking duties
- Discuss the daily news
- Challenge each other to a game of cards
- Attend a class or seminar together
- Teach or mentor someone

Reference: Remain Socially Active. (2010). Alzheimer's Association. Retrieved from http://www.alz.org/we_can_help_remain_socially_active.asp.

Life is Not All Blue

Feeling depressed is not a normal part of aging. Think for a moment about how you felt during the past week and answer the questions below:

- How are you sleeping? Do you have a problem falling asleep? Once asleep, do you have problems staying asleep?
- How is your appetite? Do you find that you lose your appetite often?
- How often do you feel hopeless? Do you feel like your life is empty?
- Have you stopped participating in many of your activities or interests?
- Do you have trouble concentrating or remembering things?
- Have you felt hopeless or fearful of the future?

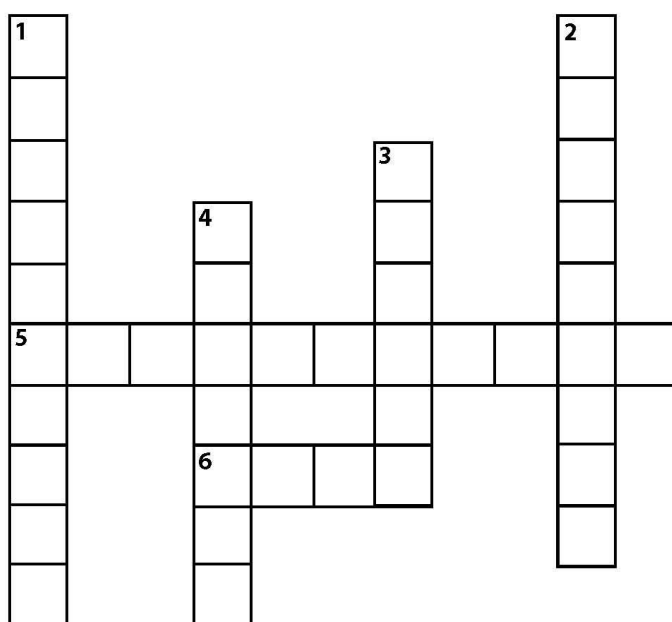


Some of these behaviors are symptoms of depression. Depression occurs more often in older adults than you may think. About 1 in 5 people age 55+ experience depression and anxiety. But just because depression affects a lot of older adults does not make it a normal part of aging. If you have experienced any of these symptoms, talk to your healthcare provider about what has been happening in your life. If it is depression, there are treatments available. Everyone deserves to feel happy and satisfied with life as they age.

References: Birner, R. B., & Vernuri, S. (2004, May). Depression in Later Life: A Diagnostic and Therapeutic Challenge. *American Family Physician*, 110(5):2375-2382. Retrieved from: <http://www.aafp.org/afp/2004/0515/p2375.html>.

Issue 04: Wellness**LIVING (WELL THROUGH) INTERGENERATIONAL FITNESS & EXERCISE****TAKE FIVE:** Try these mind strengthening tasks

1. Say the days of the week backwards, then in alphabetical order.
2. Find the sum of your date of birth, mm/dd/yyyy (Example: 03 + 24 + 1944 = 1972).
Now do the same with friends' and relatives' date of birth.
3. Name two objects for every letter in your complete name. Work up to five objects, trying to use different items each time. (Example: John Doe= jam, jacket; olive, orange; hat, house; etc).

STAYING WELL CROSSWORD**Down**

1. Part of the largest section of a healthy plate
2. Memory shortcuts
3. Should eat at least six ounces a day
4. Offer support

Across

5. Protects against heart disease and some cancers
6. Brain boosting food

ANSWERS:

1. Vegetables 2. Mnemonics 3. Grains 4. Friends 5. Antioxidant 6. Nuts

Prepared by: Jennifer Margrett, PhD, Jennifer Senia, and Sarah L. Francis, PhD, RD . Funded by: The Rural Health and Safety Education Competitive Program of the USDA National Institute of Food and Agriculture, grant number 2010-03643.

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APPENDIX F: CONSENT FORMS

INFORMED CONSENT DOCUMENT—PROGRAM PARTICIPANT

Title of Study: Promoting Older Adult Wellness through an Intergenerational Physical Activity Program

Investigators:

Dr. Sarah L. Francis, Dept. of Food Science & Human Nutrition

Dr. Warren Franke, Dept. of Kinesiology

Dr. Jennifer Margrett, Dept of Human Development and Family Studies

Mr. Marc Petersen, ISU Extension—4H Youth Development

Ms. Kara Strand, Graduate Student

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time. In order to participate in the study, it must be determined that it is safe for you to do so. This determination will be made with the Physical Activity Readiness Questionnaire (PAR-Q) screening tool, which may require additional permission from your health care provider. If it is decided that it is not safe for you to participate, you will not be permitted to continue in the LIFE Program study.

INTRODUCTION

The purpose of this study is to pilot test a community-based, intergenerational exergaming program for older and young adults (Living well through Intergenerational Fitness and Exercise [LIFE] Program). The study takes place in congregate mealsites and uses Wii® Active to promote physical activity.

LIFE Program Study Description:

This study has two main parts: **on-site physical activity (6 weeks) and follow-up newsletters (16 weeks)**. The on-site component will be held twice weekly for six weeks for a total of 90 minutes of activity (Day 1: 30 minutes Wii®, Day 2: 30 minutes Wii® and 30 minutes interactive group games) led by a young adult trainer. Wii® is the primary means for physical activity promotion during the LIFE Program; however, once weekly 30-minute group activity will be included to promote dialogue between participants and young adult trainers. The selected Wii® exercises will focus on endurance, strength, flexibility and balance. The Wii® exercises will gradually work up to 30 minutes (Week 1: 10 minutes, Week 2: 20 minutes, and Weeks 3+: 30 minutes). The newsletter program uses eight bi-monthly wellness newsletters. During the newsletter program, the young adult trainer-led program will not be conducted but the Wii® will remain on-site. On-site leaders will be encouraged to continue the program during the newsletter intervention (16 weeks).

To help us assess what was liked and disliked about the LIFE Program, you will be asked to participate in a focus group discussion. We will conduct four separate focus groups with: 1) trainers 2) participants 3) on-site leaders and 4) trainers and participants together. Focus groups will be asked to provide feedback regarding the program. The focus group discussions will be recorded; however names will not be used. The recordings will be transcribed by an independent party who will not know who attended the focus group session.

You are being invited to participate in this study because you meet the following qualifications to enroll as a **participant**: 1) age 60+, 2) physically inactive (do not typically participate in any regular physical activity long enough to work up a sweat), 3) able to read a newspaper without difficulty, 4) able to participate in a physical activity program as determined by the physical activity readiness questionnaire and/or physician permission, 5) willing to complete a six week on-site physical activity program followed by a 16 week newsletter intervention, 6) willing to complete research questionnaires and 7) willing to participate in focus group discussions.

DESCRIPTION OF PROCEDURES

If you agree to participate, you will be asked to complete both the on-site physical activity and newsletter intervention of the LIFE Program as previously described. You will also be asked to complete a comprehensive questionnaire at three different times during the study. This questionnaire may take up to 40 minutes to complete. The questionnaire will ask information about daily activities, feelings, physical activity habits. For the first questionnaire, you will be asked to provide general descriptive information. You will also be asked to complete a fitness test that will be given at three different times during the study. The fitness test will involve completing a chair stand test, grip strength and flexibility. This will be done on-site by a research team member and/or trainer and will take about 10 minutes. You will also be asked to participate in a focus group to discuss your experience. Finally, following the on-site portion of the study and after the newsletter intervention you will complete a program evaluation (about 10 minutes to complete). The program evaluation asks about what you liked and did not like about the LIFE Program and any changes (positive or negative) you may have made as a result.

RISKS

While participating in this study the risk to you is minimal. However, this is a physical activity program. There may be some risks including, but not limited to muscle soreness, fainting, disorders of heart beat, abnormal blood pressure and in very rare instances heart attack. You may also find answering pre-, post- and follow-up questionnaires inconvenient. If you choose to participate in a focus group discussion, you may feel uncomfortable with discussing your opinions in front of a group and being recorded.

BENEFITS

If you decide to participate in this study there may be direct benefit to you including increased fitness, subjective well-being and physical activity readiness to change. It is hoped that the information gained in this study will benefit society in that we will have created a physical activity program that improves health and encourages meaningful interaction between generations.

COSTS AND COMPENSATION

You will need to pay for travel from your house to the on-site program and back home. You will not receive financial compensation for participating in the study. Participants will receive an exercise video that will be given at Week 3 to help promote physically activity at home.

If you choose to participate in a focus group, you will receive a small token of appreciation. You will need to complete a form stating you received this item. This information allows the University to fulfill government reporting requirements. Confidentiality measures are in place to keep this information secure. You may forego receipt of the item and continue in the focus group discussion if you do not wish to complete this form. Information regarding documentation required for participant compensation may be obtained from the Controller's Department; 294-2555 or <http://www.controller.iastate.edu>.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. When completing the research assessment tools (questionnaires and/or focus group questions), you can skip any questions that you do not wish to answer.

CONFIDENTIALITY

Records identifying all LIFE program members will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies including the National Institute of Food and Agriculture (the funding agency), auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: each participant and trainer will be identified with a code number to which only the research team members have access. On-site leaders will be identified by the code assigned to them as a participant. Focus group participants will not be identified in any way. Identifying documents (e.g. registration forms, permission forms, and emergency contact forms) will be kept in a locked cabinet separate from the coded documents in the PI's office. The collected data will be kept for five years following the close of the study or until the results are published, whichever occurs first. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Sarah L. Francis, 515-294-1456. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in “Promoting Older Adult Wellness through an Intergenerational Physical Activity Program” study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant’s Name (printed) _____

(Participant’s Signature)

(Date)

INFORMED CONSENT DOCUMENT—YOUNG ADULT TRAINER

Title of Study: Promoting Older Adult Wellness through an Intergenerational Physical Activity Program

Investigators:

Dr. Sarah L. Francis, Dept. of Food Science & Human Nutrition

Dr. Warren Franke, Dept. of Kinesiology

Dr. Jennifer Margrett, Dept of Human Development and Family Studies

Mr. Marc Petersen, ISU Extension—4H Youth Development

Ms. Kara Strand, Graduate Student

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION

The purpose of this study is to pilot test a community-based, intergenerational exergaming program for older and young adults (Living well through Intergenerational Fitness and Exercise [LIFE] Program). The LIFE Program takes place in congregate mealsites and uses Wii Active to promote physical activity.

LIFE Program Study Description:

This study has two main parts: **on-site physical activity (6 weeks) and follow-up newsletters (16 weeks)**. The on-site component will be held twice weekly for six weeks for a total of 90 minutes of activity (Day 1: 30 minutes Wii®, Day 2: 30 minutes Wii® and 30 minutes interactive group games) led by a young adult trainer. Wii® is the primary means for physical activity promotion during the LIFE Program; however, once weekly 30-minute group activity will be included to promote dialogue between participants and young adult trainers. The selected Wii® exercises will focus on endurance, strength, flexibility and balance. The Wii® exercises will gradually work up to 30 minutes (Week 1: 10 minutes, Week 2: 20 minutes, and Weeks 3+: 30 minutes). The newsletter program uses eight bi-monthly wellness newsletters. During the newsletter program, the young adult trainer-led program will not be conducted but the Wii® will remain on-site. On-site leaders will be encouraged to continue the program during the newsletter intervention (16 weeks).

To help us assess what was liked and disliked about the LIFE Program, you will be asked to participate in a focus group discussion. We will conduct four separate focus groups with: 1) trainers 2) participants 3) on-site leaders and 4) trainers and participants together. Focus groups will be asked to provide feedback regarding the program. The focus group discussions will be recorded; however names will not be used. The recordings will be transcribed by an independent party who will not know who attended the focus group session.

You are being invited to participate in this study because you meet the following qualifications to enroll as a **young adult trainer**: 1) age 16+ (Age <18 years requires permission from a parent or legal guardian), 2) willing to complete a one-day training workshop for the LIFE Program, 3) available four hours weekly for seven to nine consecutive weeks during the on-site program, and 4) have reliable transportation.

DESCRIPTION OF PROCEDURES

If you agree to participate you will be asked to: 1) attend an eight-hour comprehensive training workshop prior to the on-site LIFE Program start, 2) complete the Youth and Aging Questionnaire at three different time points, 3) complete a program evaluation at two different time points, 4) participate in focus group discussions, 4) assist the research team to conduct the senior fit test (before and after the on-site program) for the participants, and 5) lead the on-site program as well as the on-site leader workshop (with the assistance of the research team).

The comprehensive training workshop, led by the research team and other ISU students and/or professors, will discuss the various study assessment tools being used with the participants, using Wii[®] as an intervention tool, physical activity safety issues for older adults, working with older adults, and group activities. You will receive a CD-rom containing all the information presented during the workshop for later reference. The Youth and Aging Questionnaire may take up to 40 minutes to complete and asks general descriptive information (first questionnaire only), your thoughts on aging, and current aging knowledge. The program evaluation may take up to 10 minutes to complete and asks about what you liked and did not like about the LIFE Program and any changes (positive or negative) you may have made as a result. **Your time involvement will include the one-day workshop, the on-site program implementation (up to 8 weeks) as well as completing the Youth and Aging Questionnaire following the newsletter intervention and attending a focus group session.** *If you are volunteering as a trainer to fulfill a course requirement, you may be required by your professor and/or instructor to complete other tasks in addition to what is described above. Alternative ways of receiving credit that are comparable in terms of time and effort for your participation in the research project will be available through your professor and/or instructor if you choose to discontinue serving as a trainer. You should contact professor and/or instructor for these specific alternatives. The research team will not be responsible for the evaluation of students.*

RISKS

While participating in this study the risk to you is minimal. You may be uncomfortable working with older adults. You may also find answering pre-, post- and follow-up questionnaires inconvenient. If you choose to participate in a focus group discussion, you may feel uncomfortable with discussing your opinions in front of a group and being recorded.

BENEFITS

If you decide to participate in this study there may be direct benefit to you including improved aging perceptions and knowledge and leadership skills. It is hoped that the

information gained in this study will benefit society in that we will have created a physical activity program that improves health and encourages meaningful interaction between generations.

COSTS AND COMPENSATION

You will need to pay for travel from your house to the on-site program and back home. You will not receive financial compensation for serving as a trainer for the LIFE Program. As a trainer you will receive a t-shirt to wear when leading the on-site program so that participants can easily recognize you. This will be distributed at the training workshop.

If you choose to participate in a focus group, you will receive a small token of appreciation. You will need to complete a form stating you received this item. This information allows the University to fulfill government reporting requirements. Confidentiality measures are in place to keep this information secure. You may forego receipt of the item and continue in the focus group discussion if you do not wish to complete this form. Information regarding documentation required for participant compensation may be obtained from the Controller's Department; 294-2555 or <http://www.controller.iastate.edu>.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. When completing the research assessment tools (questionnaires and/or focus group questions), you can skip any questions that you do not wish to answer. *If you are under the age of 18 years, and do not obtain permission from a parent or legal guardian, you will not be permitted to serve as a Trainer.*

CONFIDENTIALITY

Records identifying all LIFE program members will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies including the National Institute of Food and Agriculture (the funding agency), auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: each participant and trainer will be identified with a code number to which only the research team members have access. Focus group participants will not be identified in any way. Identifying documents (e.g. registration forms, permission forms, and emergency contact forms) will be kept in a locked cabinet separate from the coded documents in the PI's office. The collected data will be kept for five years following the close of the study or until the results are published, whichever occurs first. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Sarah L. Francis, 515-294-1456. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in the “Promoting Older Adult Wellness through an Intergenerational Physical Activity Program” study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed) _____

(Participant's Signature)

(Date)

IF <18 YEARS OF AGE, PARENT/GUARDIAN SIGNATURE IS REQUIRED.

Parent/Guardian Name (printed) _____

(Signature of Parent/Guardian)

(Date)

INFORMED CONSENT DOCUMENT—ON-SITE PROGRAM LEADER

Title of Study: Promoting Older Adult Wellness through an Intergenerational Physical Activity Program

Investigators:

Dr. Sarah L. Francis, Dept. of Food Science & Human Nutrition

Dr. Warren Franke, Dept. of Kinesiology

Dr. Jennifer Margrett, Dept of Human Development and Family Studies

Mr. Marc Petersen, ISU Extension—4H Youth Development

Ms. Kara Strand, Graduate Student

This is a research study. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time.

INTRODUCTION

The purpose of this study is to pilot test a community-based, intergenerational exergaming program for older and young adults (Living well through Intergenerational Fitness and Exercise [LIFE] Program). The study takes place in congregate mealsites and uses Wii Active to promote physical activity.

LIFE Program Description:

This study has two main parts: **on-site physical activity (6 weeks) and follow-up newsletters (16 weeks)**. The on-site component will be held twice weekly for six weeks for a total of 90 minutes of activity (Day 1: 30 minutes Wii®, Day 2: 30 minutes Wii® and 30 minutes interactive group games) led by a young adult trainer. Wii® is the primary means for physical activity promotion during the LIFE Program; however, once weekly 30-minute group activity will be included to promote dialogue between participants and young adult trainers. The selected Wii® exercises will focus on endurance, strength, flexibility and balance. The newsletter intervention uses eight bi-monthly wellness newsletters. During the newsletter intervention, the young adult trainer-led program will not be conducted but the Wii® will remain on-site. On-site leaders will be encouraged to continue the program during the newsletter intervention (16 weeks).

To help us assess what was liked and disliked about the LIFE Program, you will be asked to participate in a focus group discussion. We will conduct four separate focus groups with: 1) trainers 2) participants 3) on-site leaders and 4) trainers and participants together. Focus groups will be asked to provide feedback regarding the program. The focus group discussions will be recorded; however names will not be used. The recordings will be transcribed by an independent party who will not know who attended the focus group session.

You are being invited to participate in this study because you meet the following qualifications to enroll as an **on-site leader**: 1) are enrolled in the LIFE Program as a participant, 2) willing to attend a two-hour on-site leader training workshop offered at the congregate mealsite [senior center] you attend, 3) willing to co-lead the on-site LIFE program Week 6 with the Young Adult Trainer, 4) willing to lead the on-site LIFE Program after the young adult trainer has left (Weeks 7-25).

DESCRIPTION OF PROCEDURES

In addition to completing the tasks asked of you as a LIFE Program participant, you will also be asked to participate in a series of weekly trainings (starting Week 4) before or after the on-site program. The total training time will be about 4.5 hours. During these 15-20 minute twice weekly sessions you will work with the Trainer to learn how to set up the Wii equipment, operate the Wii, and lead the interactive games. On-site leaders will co-lead the on-site program Week 6 with the young adult trainer and will lead it Week 7 (the young adult trainer will be there if assistance is needed) prior to the newsletter intervention. You will be expected to continue the on-site program during the newsletter intervention (16 weeks). You will also be asked to participate in a focus group to discuss your experience as an on-site leader. Finally, at the conclusion of the study you will complete an on-site leader program evaluation (about 10 minutes to complete). The program evaluation asks about what you liked and did not like about serving as a LIFE Program on-site leader.

RISKS

While participating in this study the risk to you is minimal. In addition to the potential risks as a participant, you may be uncomfortable being trained by a young adult and instructing your peers. You may also find completing the follow-up evaluation inconvenient. If you choose to participate in a focus group discussion, you may feel uncomfortable with discussing your opinions in front of a group and being recorded.

BENEFITS

If you decide to participate in this study there may be direct benefit to you including increased fitness, subjective well-being and physical activity readiness to change. It is hoped that the information gained in this study will benefit society in that we will have created a physical activity program that improves health and encourages meaningful interaction between generations.

COSTS AND COMPENSATION

You will need to pay for travel from your house to the on-site program and back home. You will not receive financial compensation for serving as an on-site leader. As an on-site leader you will receive a t-shirt to wear when leading the on-site program so that participants can easily recognize you. This will be distributed at the training workshop.

If you choose to participate in a focus group, you will receive a small token of appreciation. You will need to complete a form stating you received this item. This information allows the University to fulfill government reporting requirements. Confidentiality measures are in place to keep this information secure. You may forego receipt of the item and continue in the

focus group discussion if you do not wish to complete this form. Information regarding documentation required for participant compensation may be obtained from the Controller's Department; 294-2555 or <http://www.controller.iastate.edu>.

PARTICIPANT RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. When completing the research assessment tools (questionnaires and/or focus group questions) you can skip any questions that you do not wish to answer.

CONFIDENTIALITY

Records identifying all LIFE program members will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies including the National Institute of Food and Agriculture (the funding agency), auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: each participant and trainer will be identified with a code number to which only the research team members have access. On-site leaders will be identified by the code assigned to them as a participant. Focus group participants will not be identified in any way. Identifying documents (e.g. registration forms, permission forms, and emergency contact forms) will be kept in a locked cabinet separate from the coded documents in the PI's office. The collected data will be kept for five years following the close of the study or until the results are published, whichever occurs first. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Sarah L. Francis, 515-294-1456. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

Your signature indicates that you voluntarily agree to participate in “Promoting Older Adult Wellness through an Intergenerational Physical Activity Program” study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant’s Name (printed) _____

(Participant’s Signature)

(Date)

APPENDIX G: MEDICAL AUTHORIZATION FORMS

Physical Activity Readiness Questionnaire (PAR-Q)

Regular physical activity is fun and healthy. More people are starting to become more active every day. Being more physically active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the table below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. **If you are over 69 years of age, and you are not used to being very active, check with your doctor.**

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly.

YES	NO	
		Has your doctor ever said you have a heart condition and that you should only do physical activity recommended by a doctor?
		Do you feel pain in your chest when you do physical activity?
		In the past month, have you had chest pain when you were not doing physical activity?
		Do you lose your balance because of dizziness or do you ever lose consciousness?
		Do you have a bone or joint problem that could be made worse by a change in your physical activity?
		Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
		Do you know of any other reason why you should not do physical activity?

If you answered YES to one or more questions:

Please take the permission letter and PAR-Q form to your doctor to sign. A doctor's signature will serve as verification that you are able to participate in the LIFE Program research project.

- You may be able to do any activity you want—as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.

If you answered NO to all questions:

If you answered 'NO' honestly to all PAR-Q questions, you can be reasonably sure that you can:

- Start becoming much more physically active—begin slowly and build up gradually. This is the safest and easiest way to go.

I attest that I have answered all PAR-Q questions honestly.

Signature

Date

Printed Name

IOWA STATE UNIVERSITY
University Extension

Sarah L. Francis, PhD MHS RD
1104 Human Nutritional Sciences
Ames, IA 50011
Phone: 515-294-1456
FAX: 515-294-6193
slfranci@iastate.edu

Dear Health Care Provider,

Your patient is interested in participating in the Living well through Intergenerational Fitness and Exercise (LIFE) Program study directed by researchers at Iowa State University. This study will be conducted at local congregate mealsites (e.g. senior centers). Your patient has brought you this letter because the Physical Activity Readiness Questionnaire (PAR-Q) has identified possible risk factors for physical activity and/or he/she is over the age of 69 years. In order to ensure the safety of your patient, these criteria require him/her to receive medical permission before participating. This moderate intensity, exergaming program uses Wii® Active. Trained personnel will be present during the eight week on-site program to offer assistance to participants. The selected activities comprising the 30 minute sessions have been selected and determined to be appropriate for inactive older adults by Dr. Warren Franke PhD, FACSM (Iowa State University, Dept. of Kinesiology). The selected activities incorporate strength, endurance and balance training. The LIFE Program study is designed to improve muscle strength, balance and flexibility. Please complete and sign the enclosed Physician Authorization Form. If you have any questions, or would like to discuss your patient's participation in this program in further detail, please call me (Sarah Francis) at 515-294-1456.

Sincerely,

Sarah L. Francis

Sarah L. Francis, PhD, MHS, RD
Assistant Professor/State Nutrition Extension Specialist
Dept. of Food Science and Human Nutrition
Iowa State University

HEALTH CARE PROVIDER AUTHORIZATION FORM

Patient Name: _____

Address: _____

Phone Number: _____

Date of Birth: _____

☐**YES**, my patient can participate in the LIFE Program study☐**NO**, my patient cannot participate in the LIFE Program study at this time due to his/her medical conditions and health status

If your patient is able to participate in the LIFE Program study, please list any **special considerations** that program trainers will need to be made aware of.

HEALTH CARE PROVIDER'S SIGNATURE: _____**HEALTH CARE PROVIDER'S PRINTED NAME:** _____**ADDRESS:** _____**PHONE:** _____ **FAX:** _____

APPENDIX H: TRAINERS' WORKSHOP AGENDA



WINTER TRAINER WORKSHOP AGENDA

Research Team: Dr. Sarah Francis, Food Science and Human Nutrition; Dr. Warren Franke, Kinesiology
Dr. Jennifer Margrett, Human Development and Family Studies; Mr. Marc Peterson, ISU Extension, Youth Development; Kara Strand, Graduate Assistant

TIME	ACTIVITY	PRESENTER
8:00-8:10	Welcome and Overview	Francis
8:10-8:45	Completion of Informed Consent and Youth and Aging Questionnaire	Francis
8:45-9:00	LIFE Program Description <ul style="list-style-type: none"> • Purpose • Program Design • Expectations of Trainers 	Margrett
9:00-10:00	Interactive Games <ul style="list-style-type: none"> • Background • Training on team building games 	Peterson
10:00-11:00	Introduction to Older Adults <ul style="list-style-type: none"> • Demographics • Myths about aging and older adults • Characteristics of older adult learners • Strategies to building successful relationships with older adults • Aging activity 	Strand
11:00-12:00	Older Adults and Physical Activity <ul style="list-style-type: none"> • Benefits to physical activity • Safety concerns • Strategies to ensure safety of older adults • Senior Fit Test Training & Practicum 	Franke
12:00-12:45	LUNCH	
12:45-1:00	Interactive Games <ul style="list-style-type: none"> • Training on team building games 	Peterson
1:00-3:00	Wii Active as a Research Tool <ul style="list-style-type: none"> • Background information • Steps to ensuring safety • How to use Wii • Practicum for workshop participants 	

3:00-3:30	Interactive Games <ul style="list-style-type: none"> • Training on team building games 	Peterson
3:30-4:30	Safety Training <ul style="list-style-type: none"> • American Red Cross approved training video with practicum 	Francis, moderator
4:30-4:45	Wrap-up <ul style="list-style-type: none"> • Question/Answers • Closing Remarks 	Research Team
4:45-5:00	Signing up for Program Days <ul style="list-style-type: none"> • Distribution of T-shirts 	

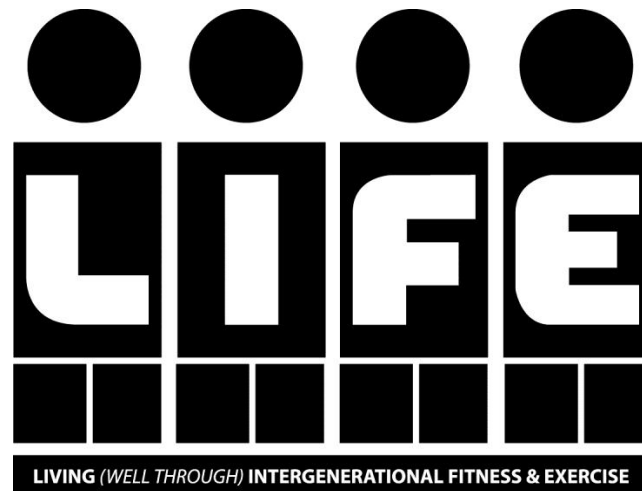


SPRING TRAINER WORKSHOP AGENDA

Research Team: Dr. Sarah Francis, Food Science and Human Nutrition; Dr. Warren Franke, Kinesiology
Dr. Jennifer Margrett, Human Development and Family Studies; Mr. Marc Peterson, ISU Extension, Youth
Development; Kara Strand, Graduate Assistant

TIME	ACTIVITY	PRESENTER
8:00-8:05	Welcome and Overview	Francis
8:05-8:40	Completion of Informed Consent and Youth and Aging Questionnaire	Francis
8:40-9:00	Interactive Games <ul style="list-style-type: none"> • Training on team building games 	Peterson
9:00-9:15	LIFE Program Description <ul style="list-style-type: none"> • Purpose • Program Design • Expectations of Trainers 	Margrett
9:15-10:15	Introduction to Older Adults <ul style="list-style-type: none"> • Demographics • Myths about aging and older adults • Characteristics of older adult learners • Strategies to building successful relationships with older adults • Aging activity 	Strand
10:15-10:25	Wii Active as a Research Tool <ul style="list-style-type: none"> • Background information • Steps to ensuring safety • How to use Wii 	Francis
10:25-12:00	Mock LIFE Program Wii Session <ul style="list-style-type: none"> • Set up of Wii (Trainers) • Run-through of a normal session (Demonstration by Team) <ul style="list-style-type: none"> ○ Tips for leading a successful program ○ How to correct participants' movements • Run-through of a normal session (Trainers) <ul style="list-style-type: none"> ○ Alternating with partner as trainer/participant 	Research Team
12:00-1:00	LUNCH with Spring Trainers	
1:00-2:00	Interactive Games <ul style="list-style-type: none"> • Background • Training on team building games 	Peterson
2:00-2:30	SNACK with Older Adults from Spring	

2:30-3:00	Older Adults and Physical Activity <ul style="list-style-type: none"> • Benefits to physical activity • Safety concerns • Strategies to ensure safety of older adults • Senior Fit Test Training & Practicum 	Calabro
3:00-3:30	Interactive Games <ul style="list-style-type: none"> • Training on team building games 	Peterson
3:30-4:30	Safety Training <ul style="list-style-type: none"> • American Red Cross approved training video with practicum 	Francis, moderator
4:30-4:45	Wrap-up <ul style="list-style-type: none"> • Question/Answers • Closing Remarks 	Research Team
4:45-5:00	Signing up for Program Days <ul style="list-style-type: none"> • Distribution of T-shirts 	

APPENDIX I: PARTICIPANT QUESTIONNAIRE ASSESSMENT**QUESTIONNAIRE**

The questions contained in this questionnaire are intended to help us better understand the general characteristics of LIFE Program participants. Your answers will remain confidential. Your name does not appear anywhere on this questionnaire. Please take your time completing this questionnaire. It may take up to 40 minutes to complete.

PLEASE USE A PEN.

(8 pages including cover)

Please provide the following general information.

	<i>Office Use Only</i>
1. Age: _____ years	OAQPRE1
2. Sex: <input type="checkbox"/> Male (1) <input type="checkbox"/> Female (2)	OAQPRE2
3. Ethnicity: <input type="checkbox"/> Caucasian (1) <input type="checkbox"/> African American (2) <input type="checkbox"/> Asian (3) <input type="checkbox"/> Other (4)	OAQPRE3
4. Marital status: <input type="checkbox"/> Single, never married (1) <input type="checkbox"/> Married (2) <input type="checkbox"/> Divorced (3) <input type="checkbox"/> Widowed (4)	OAQPRE4
5. In general, how would you describe your health: <input type="checkbox"/> Very poor (1) <input type="checkbox"/> Somewhat poor (2) <input type="checkbox"/> Average (3) <input type="checkbox"/> Somewhat good (4) <input type="checkbox"/> Very good (5)	OAQPRE5
6. Living arrangement <input type="checkbox"/> Community-residing: apartment or home (1) <input type="checkbox"/> Independent &/or Assisted Living Facility (2) <input type="checkbox"/> With Adult Children (3) <input type="checkbox"/> Other (4)	OAQPRE6
7. In a typical day, how many times do you have contact with high school or college-age youth/young adults? <input type="checkbox"/> Never (1) <input type="checkbox"/> Occasionally (2) <input type="checkbox"/> Several times a day (3)	OAQPRE7

Now we would like to ask you about things that we all need to do as part of our daily lives. We would like to know if you can do these activities without any help at all, or if you need some help to do them, or if you can't do them at all.

	<i>Office Use Only</i>
8. Can you use the telephone... A. Without help, including looking up number and dialing B. With some help or C. Are you completely unable to use the telephone	ADLPRE1
9. Can you get to places out of walking distance... A. Without help (drive your own car, or travel alone on buses, or taxis) B. With some help (need someone to help you or go with you when traveling or C. Are you unable to travel unless emergency arrangements are made for a specialized vehicle like an ambulance?	ADLPRE2
10. Can you go shopping for groceries or clothes (assuming that you have transportation)... A. Without help (taking care of all shopping needs yourself, assuming you had transportation) B. With some help (need someone to go with you on all shopping trips; or C. Are you completely unable to do any shopping	ADLPRE3
11. Can you prepare your own meals... A. Without help (plan and cook full meals yourself) B. With some help (can prepare some things but unable to cook full meals yourself); or C. Are you completely unable to prepare any meals?	ADLPRE4
12. Can you do your housework... A. Without help (can clean floors, etc) B. With some help (can do light housework but need help with heavy work); or C. Are you completely unable to do any housework?	ADLPRE5

	<i>Office Use Only</i>
<p>13. Can you take your own medicine...</p> <ul style="list-style-type: none"> A. Without help (in the right doses at the right time); B. With some help (able to take medicine if someone prepares it for you and/or reminds you to take it); or C. Are you completely unable to take your medicine? 	ADLPRE6
<p>14. Can you handle your own money...</p> <ul style="list-style-type: none"> A. Without help (write checks, pay bills, etc) B. With some help (manage day-to-day buying but need help with managing your checkbook and paying your bills); or C. Are you completely unable to handle money? 	ADLPRE7
<p>15. Can you eat...</p> <ul style="list-style-type: none"> A. Without help (able to feed yourself completely) B. With some help (need help with cutting, etc); or C. Are you completely unable to feed yourself? 	ADLPRE8
<p>16. Can you dress and undress yourself...</p> <ul style="list-style-type: none"> A. Without help (able to pick out clothes, dress and undress yourself) B. With some help; or C. Are you completely unable to dress and undress yourself? 	ADLPRE9
<p>17. Can you take care of your own appearance, for example combing your hair and (for men) shaving...</p> <ul style="list-style-type: none"> A. Without help B. With some help; or C. Are you completely unable to maintain your appearance yourself? 	ADLPRE10
<p>18. Can you walk...</p> <ul style="list-style-type: none"> A. Without help (except from a cane) B. With some help (from a person or with the use of a walker, or crutches, etc; or C. Are you completely unable to walk? 	ADLPRE11

	<i>Office Use Only</i>
19. Can you get in and out of bed... A. Without any help or aids B. With some help (either from a person or with the aid of some device); or C. Are you totally dependent on someone else to lift you?	ADLPRE12

Please read the definition of **Regular Physical Activity** below:

For physical activity to be considered “regular” it must be done for 30 minutes at a time (or more) per day, and be done at least four days per week. The intensity of activity does not have to be vigorous but should be enough to increase your heart rate and/or breathing level somewhat. Examples of activities could include brisk walking, leisure biking, swimming, line dancing, and aerobics classes or any other activities and other activities with a similar intensity level.

According to the above definition:

	YES	NO
1. Do you currently engage in regular physical activity?		
2. Do you intend to engage in regular physical activity in the next 6 months?		
3. Do you intend to engage in regular physical activity in the next 30 days?		
4. Have you been regularly physically active for the past six months?		
<p>Office use only (circle one):</p> <p>STAGEPRE: PC(1) C (2) P (3) A (4) M (5)</p>		

Please mark the answer that best describes how you felt over the past week.

	Yes (1)	No (2)	Office Use Only
1. Are you basically satisfied with your life?			GDSPRE1
2. Have you dropped many of your activities and interests?			GDSPRE2
3. Do you feel that your life is empty?			GDSPRE3
4. Do you often get bored?			GDSPRE4
5. Are you in good spirits most of the time?			GDSPRE5
6. Are you afraid that something bad is going to happen to you?			GDSPRE6
7. Do you feel happy most of the time?			GDSPRE7
8. Do you often feel helpless?			GDSPRE8
9. Do you prefer to stay at home, rather than going out and doing things?			GDSPRE9
10. Do you feel that you have more problems with memory than most?			GDSPRE10
11. Do you think it is wonderful to be alive now?			GDSPRE11

12. Do you feel worthless the way you are now?			GDSPRE12
13. Do you feel full of energy?			GDSPRE13
14. Do you feel that your situation is hopeless?			GDSPRE14
15. Do you think that most people are better off than you are?			GDSPRE15
Office use only TOTAL _____			GDSPRE16

The below scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. **Use the following scale to record your answers:**

1= Very Slightly or Not at All

2= A Little

3= Moderately

4=Quite a Bit

5= Extremely

		<i>Office Use Only</i>			<i>Office Use Only</i>
	Interested	PANAPRE1		Irritable	PANAPRE11
	Distressed	PANAPRE2		Alert	PANAPRE12
	Excited	PANAPRE3		Ashamed	PANAPRE13
	Upset	PANAPRE4		Inspired	PANAPRE14
	Strong	PANAPRE5		Nervous	PANAPRE15
	Guilty	PANAPRE6		Determined	PANAPRE16
	Scared	PANAPRE7		Attentive	PANAPRE17
	Hostile	PANAPRE8		Jittery	PANAPRE18
	Enthusiastic	PANAPRE9		Active	PANAPRE19
	Proud	PANAPRE10		Afraid	PANAPRE20

Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

SLD Strongly disagree

D Disagree

SD Slightly disagree

N Neither agree or disagree

SA Slightly agree

A Agree

SLA Strongly agree

	SLD	D	SD	N	SA	A	SLA	<i>Office Use Only</i>
1. In most ways my life is close to my ideal.	1	2	3	4	5	6	7	SWLPRE1
2. The conditions of my life are excellent.	1	2	3	4	5	6	7	SWLPRE2
3. I am satisfied with life.	1	2	3	4	5	6	7	SWLPRE3
4. So far I have gotten the important things I want in life.	1	2	3	4	5	6	7	SWLPRE4
5. If I could live my life over, I would change almost nothing.	1	2	3	4	5	6	7	SWLPRE5

The following information will be gathered by a member of the research team.

Test	Trial One	Trial two	Average	<i>Office Use Only</i>
Chair Stand (# in 30 seconds)				FITPRE1
Back Scratch—RIGHT ARM UP (nearest $\pm \frac{1}{2}$ inch)				FITPRE2A
Back Scratch—LEFT ARM UP (nearest $\pm \frac{1}{2}$ inch)				FITPRE2B
Handgrip test--RIGHT (pounds per dynameter)				FITPRE3A
Handgrip test--LEFT (pounds per dynameter)				FITPRE3B

LATE LIFE FDI: FUNCTION COMPONENT

INSTRUCTIONS:

In this following section, you will be asked about your ability to do specific activities as part of your daily routines. We are interested in *your sense of ability* to do it on a typical day. It is not important that you actually do the activity on a daily basis. In fact, some activities may be mentioned that you don't do at all. You can still answer these questions by assessing how difficult you think they would be for you to do on an average day.

Factors that influence the level of difficulty you have may include: pain, fatigue, fear, weakness, soreness, ailments, health conditions, or disabilities.

We want to know how difficult the activity would be for you to do without the help of someone else, and without the use of a cane, walker or any other assistive walking device (or wheelchair or scooter). Using fixed support is acceptable (e.g. holding onto furniture, walls), unless otherwise specified in the question.

A visual aid with a description of each possible answer is provided for you to help in your assessment in whether you think your ability for each question is:

None

A little

Some

Quite a lot

Cannot do

Let's begin...

Function Questions

How much difficulty do you have....? (Remember this is without the help of someone else and without the use of any assistive walking device.)	None	A little	Some	Quite a lot	Cannot do	Office Use Only
F1. Unscrewing the lid off a previously unopened jar without using any devices	5	4	3	2	1	LLFPRE1
F2. Going up & down a flight of stairs inside, using a handrail.	5	4	3	2	1	LLFPRE2
F3. Putting on and taking off long pants (including managing fasteners)	5	4	3	2	1	LLFPRE3
F4. Running ½ mile or more	5	4	3	2	1	LLFPRE4
F5. Using common utensils for preparing meals (e.g., can opener, potato peeler, or sharp knife)	5	4	3	2	1	LLFPRE5
F6. Holding a full glass of water in one hand	5	4	3	2	1	LLFPRE6
F7. Walking a mile, taking rests as necessary	5	4	3	2	1	LLFPRE7
F8. Going up & down a flight of stairs outside, without using a handrail	5	4	3	2	1	LLFPRE8
F9. Running a short distance, such as to catch a bus	5	4	3	2	1	LLFPRE9
F10. Reaching overhead while standing, as if to pull a light cord	5	4	3	2	1	LLFPRE10
F11. Sitting down in and standing up from a low, soft couch	5	4	3	2	1	LLFPRE11
F12. Putting on and taking off a coat or jacket	5	4	3	2	1	LLFPRE12
F13. Reaching behind your back as if to put a belt through a belt loop	5	4	3	2	1	LLFPRE13
F14. Stepping up and down from a curb	5	4	3	2	1	LLFPRE14
F15. Opening a heavy, outside door	5	4	3	2	1	LLFPRE15

F16. Rip open a package of snack food (e.g. cellophane wrapping on crackers) using only your hands	5	4	3	2	1	LLFPRE16
F17. Pouring from a large pitcher	5	4	3	2	1	LLFPRE17
F18. Getting into and out of a car/taxi (sedan)	5	4	3	2	1	LLFPRE18
F19. Hiking a couple of miles on uneven surfaces, including hills	5	4	3	2	1	LLFPRE19

Function Questions, continued

How much difficulty do you have....? (Remember this is without the help of someone else and without the use of any assistive walking device.)	None	A little	Some	Quite a lot	Cannot do	Office Use Only
F20. Going up and down 3 flights of stairs inside, using a handrail	5	4	3	2	1	LLFPRE20
F21. Picking up a kitchen chair and moving it, in order to clean	5	4	3	2	1	LLFPRE21
F22. Using a step stool to reach into a high cabinet	5	4	3	2	1	LLFPRE22
F23. Making a bed, including spreading and tucking in bed sheets	5	4	3	2	1	LLFPRE23
F24. Carrying something in both arms while climbing a flight of stairs (e.g. laundry basket)	5	4	3	2	1	LLFPRE24
F25. Bending over from a standing position to pick up a piece of clothing from the floor	5	4	3	2	1	LLFPRE25
F26. Walking around one floor of your home, taking into consideration thresholds, doors, furniture, and a variety of floor coverings	5	4	3	2	1	LLFPRE26
F27. Getting up from the floor (as if you were laying on the ground)	5	4	3	2	1	LLFPRE27
F28. Washing dishes, pots, and utensils by hand while standing at sink	5	4	3	2	1	LLFPRE28
F29. Walking several blocks	5	4	3	2	1	LLFPRE29
F30. Taking a 1 mile, brisk walk without stopping to rest	5	4	3	2	1	LLFPRE30
F31. Stepping on and off a bus	5	4	3	2	1	LLFPRE31
F32. Walking on a slippery surface outdoors	5	4	3	2	1	LLFPRE32

Function Questions For those who use walking devices

The following are questions only for people using canes, walkers, or other walking devices.

When you use your cane, walker, or other walking device, how much difficulty do you have...?	None	A little	Some	Quite a lot	Cannot do	<i>Office Use Only</i>
FD7. Walking a mile, taking rests as necessary	5	4	3	2	1	LLFPRE7
FD8. Going up & down a flight of stairs outside, without using a handrail	5	4	3	2	1	LLFPRE8
FD14. Stepping up and down from a curb	5	4	3	2	1	LLFPRE14
FD15. Opening a heavy, outside door	5	4	3	2	1	LLFPRE15
FD26. Walking around one floor of your home, taking into consideration thresholds, doors, furniture, and a variety of floor coverings	5	4	3	2	1	LLFPRE26
FD29. Walking several blocks	5	4	3	2	1	LLFPRE29
FD30. Taking a 1 mile, brisk walk without stopping to rest	5	4	3	2	1	LLFPRE30
FD32. Walking on a slippery surface, outdoors	5	4	3	2	1	LLFPRE32

LATE LIFE FDI: DISABILITY COMPONENT

INSTRUCTIONS:

In this following section, you will be asked about everyday things you do at this time in your life. There are two parts to each question. The first part of each question will ask you *How often* you do a certain activity. The second part of each question will ask you *To what extent do you feel limited* in doing the activity.

For the first part of the question, please choose from the following answers:

Very often
Often
Once in awhile
Almost never
Never

For the second part of the question, please choose from the following answers:

Not at all
A little
Somewhat
A lot
Completely

For example, you might feel limited because of your health, or because it takes a lot of mental and physical energy. Please keep in mind that you can also feel limited by factors outside of yourself. Your environment could restrict you from doing the things; for instance, transportation issues, accessibility, and social or economic circumstances could limit you from doing things you would like to do. Think of all these factors when you answer this section.

For each question, please select the one answer that comes closest to the way you have been feeling.

Let's begin...

Disability Questions

	(A) How often do you...?					(B) To what extent do you feel limited in...?					<i>Office Use Only</i>	<i>Office Use Only</i>
	Very Often	Often	Once in a while	Almost never	Never	Not at all	A little	Somewhat	A lot	Completely		
D1. Keep (Keeping) in touch with others through letters, phone, or email.	5	4	3	2	1	5	4	3	2	1	LLDPRE1A	LLDPRE1B
D2. Visit (Visiting) friends and family in their homes	5	4	3	2	1	5	4	3	2	1	LLDPRE2A	LLDPRE2B
D3. Provide (Providing) care or assistance to others. This may include providing personal care, transportation, and running errands for family members or friends.	5	4	3	2	1	5	4	3	2	1	LLDPRE3A	LLDPRE3B
D4. Take (Taking) care of the inside of your home. This includes managing and taking responsibility for homemaking, laundry, housecleaning and minor household repairs.	5	4	3	2	1	5	4	3	2	1	LLDPRE4A	LLDPRE4B

D5. Work (Working) at a volunteer job outside your home.	5	4	3	2	1	5	4	3	2	1	LLDPRE5A	LLDPRE5B
D6. Take (Taking) part in active recreation. This may include bowling, golf, tennis, hiking, jogging, or swimming.	5	4	3	2	1	5	4	3	2	1	LLDPRE6A	LLDPRE6B
D7. Take (Taking) care of household business and finances. This may include managing and taking responsibility for your money, paying bills, dealing with a landlord or tenants, dealing with utility companies or governmental agencies.	5	4	3	2	1	5	4	3	2	1	LLDPRE7A	LLDPRE7B
D8. Take (Taking) care of your own health. This may include managing daily medications, following a special diet, scheduling doctor's appointments.	5	4	3	2	1	5	4	3	2	1	LLDPRE8A	LLDPRE8B

	(A) How often do you...?					(B) To what extent do you feel limited in...?					<i>Office Use Only</i>	<i>Office Use Only</i>
	Very Often	Often	Once in a while	Almost never	Never	Not at all	A little	Somewhat	A lot	Completely		
D9. Travel (Traveling) out of town for at least an overnight stay.	5	4	3	2	1	5	4	3	2	1	LLDPRE9A	LLDPRE9B
D10. Take (Taking) part in a regular fitness program. This may include walking for exercise, stationary biking, weight lifting, or exercise classes.	5	4	3	2	1	5	4	3	2	1	LLDPRE10 A	LLDPRE10 B
D11. Invite (Inviting) people into your home for a meal or entertainment.	5	4	3	2	1	5	4	3	2	1	LLDPRE11 A	LLDPRE11 B
D12. Go (Going) out with others to public places such as restaurants or movies.	5	4	3	2	1	5	4	3	2	1	LLDPRE12 A	LLDPRE12 B

D13. Take (Taking) care of your own personal care needs. This includes bathing, dressing, and toileting.	5	4	3	2	1	5	4	3	2	1	LLDPRE13 A	LLDPRE13 B
D14. Take (Taking) part in organized social activities. This may include clubs, card playing, senior center events, community or religious groups.	5	4	3	2	1	5	4	3	2	1	LLDPRE14 A	LLDPRE14 B
D15. Take (Taking) care of local errands. This may include managing and taking responsibility for shopping for food and personal items, and going to the bank, library, or dry cleaner.	5	4	3	2	1	5	4	3	2	1	LLDPRE15 A	LLDPRE15 B
D16. Prepare (Preparing) meals for yourself. This includes planning, cooking, serving, and cleaning up.	5	4	3	2	1	5	4	3	2	1	LLDPRE16 A	LLDPRE16 B

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